Arkansas Geological Survey.

Records of Analyses of Clays Limestones Kaolins

R N Brackett Chemist
J P Smith assistant

Jan 15, 1890

Binox. Mang.	81.703
Protox "	7.281
Sesquiox Fe	.533
Oxide Cobalt	.354
" Nickel	.096
" Zinc	.623
" Copper	none
Alumina	.896
Baryta	.829
Lime	.880
Magnesia	.630
Sulphuric acid	none
Phosphoric "	.171
Alkalies	.467
Water	3.405
Silica	2.132
	100.000
Metallic Mn	57.291
" Fe	.373
Phosphorus	.075

McCreath, Andrew S.
"The Iron Ores of the Valley of Virginia."
Analysis of Clemmons ore:

THE HAILE GOLD MINE.

South Carolina has the Leading Mine in the East.

[From the Lancaster Review.]

Stuart Cramer, assayer in charge of the mint, has just completed a report of the gold and silver mines of the South for the census bureau. The Haile gold mine in Lancaster County, S. C., is at present the leading mine in the East. It produced last month $8,230 in bullion, and this month $9,185. The following facts in connection with this mine, written by Mr Cramer, appeared in the Engineering and Mining Journal, of New York:

At the present time this mine is very well known to mining men, as there has been a good deal of writing about the Thies chlorination process, which is being practiced here by Thies himself. During the month of May 2,000 tons of ore were mined, milled and concentrated; the total expense was $3,550; the value of the bullion was $9.230 98, and taking off all expenses the profit was $5,080 68.

This property is undoubtedly the equal of any in the country as far as the management goes, and the results obtained will go toward showing what can be done in the South.

The plant consists of a complete forty stamp mill with twenty more under construction; sixteen Febrey concentrators, eight more to be added for the extra twenty stamps; two double hearth, reverberatory furnaces for roasting, one single hearth, reverberatory roasting furnace thirty feet long, with pan attachment under construction; a Spence furnace idle, and two chlorinators.

The mining plant consists of an air compressor capable of supplying ten drills, steam hoisters, automatic dumping cars, a train of six cars and locomotive for transporting ore from mine to mill, a distance of three-quarters of a mile, and automatic arrangements for dumping cars into bins in mill house.

1

Wt glass + SiO_2	8.2318
Wt. glass	6.2300
Wt impalpable SiO_2 =	2.0018

Flask I

Wt glass + SiO_2	8.6691
Wt glass	6.6648
Wt 100-150 mesh SiO_2 =	2.0043

(Flask II)

Wt glass + SiO_2	8.6682
wt glass	6.6648
Wt 60-100 mesh SiO_2 =	2.0034

Flask III.

~~Partial~~ ~~Boy Van~~ T. C. D Van Nuys -

Silica —	55.33 per cent.
Alumina —	22.77
Iron oxide (Fe_2O_3)	8.00
Water	5.89
	91.99 —

381

Bolivar Cyprus soil 36
Brannon J.C. clays 31
Brannon J.C. Kaolins 50, 52,

Call R.R. clays, 15-30 inclusive)
Call R.R. soils 36-49 (inclusive)
Call, iron ore Spruce Creek 49

Lab No 4793 p. 48

Gainesville, clay 25, 27

Graphite experiments 56, 57

Harrisburg 17, 19, 40, 42,

Hopkins, H.C., Limestones & marbles pp. 72–93.

Marbles Limestones E.H.A. 72-93.

Mariana Soil #6

Nantucle, 50-54

Tallow Clay 31-35

Wittsburg soil HH

Penrose —

Lab. No 467 — "Batesville, Ark. silicate?"

Treated with HCl (dil.) — boiled — washed — dried (all in lumps) — powdered brown lumps — and analyzed.

For water, loss at 110°

wt air dried = 1.0038 grams.

wt dried 110°–118°C = _____

92.83% wt SiO_2 = .93192 gram

2.22% wt $Fe_2O_3 + Al_2O_3$ = .02232 gram

(practically all Fe_2O_3) wt Fe_2O_3 = _____

wt CaO (Mn_3O_4) = .03059 about $\frac{2}{3}$ CaO = .01524 / $\frac{1}{3}$ Mn_3O_4 = .01019 ≈ .01019

MnO = .01482 = 1.44 = .0095 = 0.94%

wt $Mg_2P_2O_7$ = .00979 ∴ MgO = .003527 = 0.35%

wt $Mn_2P_2O_7$ = .01182

MnO = .005908 = 0.58%

Total MnO = .58 + .94 = 1.54 % MnO

Resumé of analysis air-dried material:

Silica (SiO_2)	92.83	92.83
Alumina (Al_2O_3)	2.22	2.22
Ferric oxide (Fe_2O_3)		
Lime (CaO)	1.51	2.02
Magnesia (MgO)	0.35	0.35
Manganese protoxide (MnO)		1.54
		98.96
Carbonic acid (CO_2) for (CaO)		1.58
		100.54

(Anal 8)

Lab No. 361. Yellow clay: " Notebook 50. pg 10.
June 22, 1887. 1/8 mi. north of Spence Creek
on top of highest land. Overlies orange sand pebbles
and stratified O.S. sands. R. E. Call.

25 grams for sand. wt sand =

note no effervescence with hydrochloric acid. Percent sand =

Note. sand red white & black - after treatment
with boiling slate color. mostly very fine.

Water & loss B.B.
7.5015
7.5000 gained
Percent water
1.85%

wt = 2.0000 gm.
C+C & wt = 9.5386
after = 9.5015
water at 110°C = 0.0371

Percent Loss B.B.
2.18%

C+C & ignit = 9.5015
after = 9.4587
loss B.B. = 0.0428

Alkali Carb fusion.

wt air dry = 1.0093 gm
wt dry at 110°C = 0.9907 >

faint reaction for Mn.

Percent SiO_2
85.83%

wt SiO_2 = 0.85032 gm.

10.16
2.66%
7.50%

wt $Fe_2O_3 + Al_2O_3$ = 0.10072 gm.
wt Fe_2O_3 = 0.02642
wt Al_2O_3 = 0.07430

Percent CaO 0.32%

wt CaO = 0.00322 gm

Percent MgO 0.35%

wt $Mg_2P_2O_7$ = 0.00972 gm
wt MgO = 0.00350

Resumé 361

Silica	85.83	per cent	
Alumina	7.50	"	"
Ferric oxide	2.66	"	"
Lime	0.32	"	"
Magnesia	0.35	"	"
Alkalies (by difference)	1.16		
Loss on ignition	2.18		
	100.000%	98.84	

RK

BS

361.25 gm for Sand. Wt Sand = 16.1227 gm

Percent Sand = 65.69% in clay dried at 110°C.

I (By Wm Kennedy 1890) wt air dry sand = 16.2 grams

II made by Wm Kennedy wt air dry sand = 14.92 grams

I air dry sand = 64.80 %
dried @ 110-115°C = 65.69

II air dry sand = 59.68
dried @ 110-115°C =

Two Specimens from Kennedy to determine loss on ignition of air dry spec

A - marked: Washita Coal Mining Co. Lester station. Cotton Belt

wt air dry = 1.9246 Grams
Loss BB = 0.1864
Percent loss BB = 9.68% (= water & loss on ignition)

B. marked. Alma & James Clay.

wt air dry = 1.7219 Grams
Loss BB = 0.1673 "
Percent loss BB = 9.71% (water & loss ign)

Feb 20/890

C. Lignite Clay. Malvern wt air dry = 1.4164 grams

Loss BB { volatile matter = .24705 "
{ water
Per cent loss BB = 17.44%

Total per cent of matter lost in burning with free sulphur & gas = 23.05%

Loss on incinerating = .07955 grams
Per cent loss on incinerating = 5.61%

Note: Residue pink - wt of it is = 1.0893 gram = 76.9%

5.61
17.44
23.05

Lab. No. 362

Clay marked: "June, 12. 1889. Harrisburg, 11N, 3 East, N.E. 1/4, N.W. 1/4 Section 25. Hard pan clay, 8 feat from surface, below buckshot zone, 6 to 20 feat thick. (Anal. 10.) R.E. Call. "

For water & loss B/B. wt = 1.9972 gm

10.0481, 10.0453, 10.0444

Percent water 2.10%

crucible + ignit = 10.0864
after = 10.0444
water at 110°C = 0.0420

Percent loss B/B 2.88%

crucible + ignit = 10.0420
after = 9.9855
loss B/B = 0.0565

Alk. Carb. fusion reacts for Mn. decided

wt air dry = 1.0434 gm
wt dry at 110°C = 1.0215 gm

Percent SiO_2 81.37%

wt SiO_2 = 0.83122 gm

Percent CaO = 0.44%

wt CaO = 0.00452 gm

Percent

Fe_2O_3 + Al 11.40%
Fe_2O_3 = 2.88 "
Al_2O_3 8.52%

wt Fe_2O_3 + Al = 0.11652 gm
wt Fe_2O_3 = 0.02952
wt Al_2O_3 = 0.08700

MgO 0.50%

wt $Mg_2P_2O_7$ = 0.01429 gm
wt MgO = 0.00516

$MnSO_4$ 1.01%

wt $MnSO_4$ = 0.01032 gm

Resume of 362.

Silica	81 37	
Alumina	8 52	(01C)
Ferric oxide	2 88	(30 2)
Lime	0 44	
Magnesia	50	
Manganese red oxide.	1 01	
Alkalies	2 40	
Loss on ignition	2 88	
	100 00	(97 60)

By W.M.K.

Air dry sand in air dry clay

28 08 / 100 / 2.40

3/6 2 — 25 grms for Sand (air dry) (hygr. C.) Extracted Sand = 7.02 grms

25) 702.00 (28.08
50
200
200

D. Ebeye Holdings - S.W.¼ of S.E.¼ of Section 2, 15, 1 W. -

For water & Hygr.

wt air dry = 1.0011 grams.
" " @ 110°-115°C = _____

wt C + clay bf ht. = 9.1489 gram.
" + " af ht = 9.1311 "
" water = 0.0178 "

Water = 1.77%

wt C + clay bf ht Hygr. = 9.1311
" + " af ht Hygr. = 9.0689
wt loss Hygr. = 0.0622

Hygr. = 6.32%

P. [illegible]

Kennedy

D. clay separated:

For water & Hygr.

wt air dry = 1.0031 grm.
wt @ 110°-115°C = _____

wt C + D bf ht = 9.78905
wt C + D af ht = 9.76400
wt water = 0.02505

Water 2.49%

Burns -

Lab. No. 363. Clay, marked: "Notebook 50. pg 11. June 22, 1889. Harrisburg, NE 1/4, NE 1/4, Sec 25, 11N, 3 East. 3 feet from surface. (Anal 14). R. E. Call."

for water & loss B.B.

9.4108 / 9.4108	Percent water	wt of crucible & lid	= 9.4605
2.48%		crucible after	= 9.4108
		water at 110°C	= 0.0497
Loss B/B		crucible & ignited	= 9.4108
3.26%		crucible after	= 9.3471
		loss B/B	= 0.0637

Alkali Carbfusion. wt air dry = 1.0095 gm
Faint reaction for Mn. wt dry at 110°C = 0.9845 " >

Percent SiO_2		
81.79%	wt SiO_2 =	0.80532 gm.
Fe+Al = 13.40 %	wt Fe + Al =	0.13193 gm
Fe_2O_3 = 4.03 %	wt Fe_2O_3 =	0.03972
Al_2O_3 = 9.37 %	wt Al_2O_3 =	0.09221
0.31%	wt CaO =	0.00312 gm
Percent MgO 0.38%	wt $Mg_2P_2O_7$ =	0.01062 gm
	wt MgO =	0.00382 " >

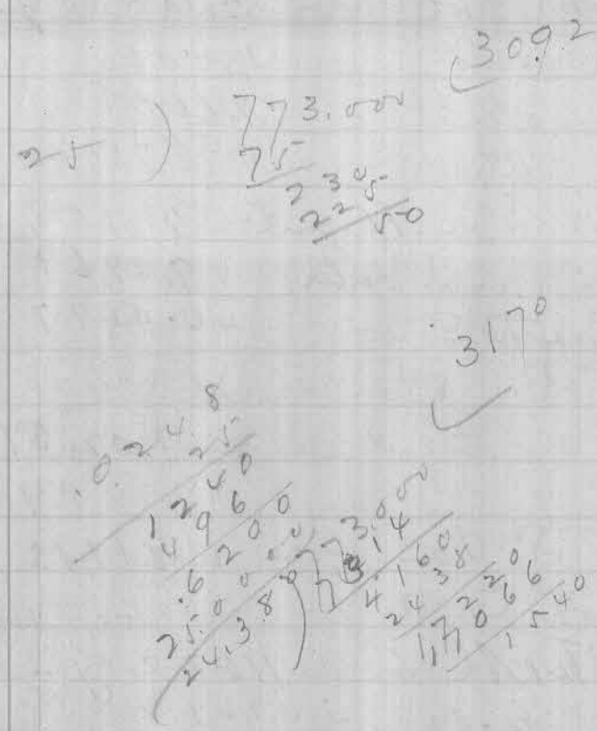
Resumé 363

Silica	81	79	per cent
Alumina	9	37	
Ferric oxide	4	03	OK
Lime		31	
Magnesia		38	Bad
Alkalies		86	
Loss on ignition	3	26	
	100	00	(99.14)

Air dry Sand in air dry Clay 30 92. 0.861

363 - 25 grams for Sand.

(Wm Kennedy. 1 ct sand air dry sand = 7.73 grams.



Lab. No. 364. Unburnt brick "from Brick-yard at Paragould. (trial 15) R.E. Call"

for water & loss BB. wt = 2.0000 gm.

9.1679 / 9.1658 Percent water 2.04% — c+c of wt = 9.2066; after = 9.1658; water at 110°C = 0.0408

Percent loss BB 3.55% — c+c. of wt = 9.1658; after = 9.0961; loss BB = 0.0697

Alk. Carb. fusion. — wt air dry = 1.0470 gm; wt dry at 110°C = 1.0257 "

Strong Manganese reaction. pink color with acid.

SiO_2 79.07% — wt SiO_2 = 0.81112 gm.

Percent CaO = 0.25% — wt CaO = 0.00262 gm

Fe+Al = 11.33% — wt Fe+Al = 0.11622 gm

2.54 " Fe_2O_3 = 0.02612

8.79% Al_2O_3 = 0.09010

MgO 0.23% — wt $Mg_2P_2O_7$ = 0.00669; wt MgO = 0.00241

Mn_3O_4 = 3.68% wt Mn_3O_4 = 0.03782 gm

Resumé 364

Silica	79 07	per cent.
Alumina	8 79	
Ferric oxide	2 54	
Lime	25	
Magnesia	23	
Alkalies (?) by difference	1 89	
Loss on ignition	3 55	
Manganese, red oxide	3 68	
	100 00	(98.11)

By Wmk. Air dry loss in air dry clay 43 64 per cent.

36 24. 25 grams air dry
(W. Kennedy) ct air dry sand = 10.91 grams.

+ 36 ct

25) 1091.00
100
91
25
1600
1500
100

Lab no 518 / Feldspar — Potash Sulphur Springs —
Garland County — Ark. — for alkalies. — Collector
Francis Williams.
May 11 "1891. — Little Rock, Ark. — H. G. Latimer.
wt air-dried = 0.5050 gram.
=

wt Na Cl + K Cl = 0.1216 — K2O = .01573 = 3.11
wt K Cl = 0.0249 — Na2O = .05131 = 10.16
wt Na Cl = 0.0967

wt K2 Pt Cl6 = .0816

K2O 3.11 9.15 14.23
Na2O 10.16 5.08 13.16
0816
3408

K2O .0515 = 10.20
Na2O .02122 = 4.20

518. all ct air-dried = .5143 gram.
wt K Cl + Na Cl =
wt K Cl =
wt Na Cl
wt K2 Pt Cl6
K2O = = Percent
Na2O = =

.0972

Lab. No. 365. Unburnt brick. "Jonesboro, Brick clay. (Anal 16) R. E. Call."

for water and loss BB. wt = 2.0000 gm.

9.4862 / 9.4862 Percent water — C+C & ht = 9.5387
2.62% — after = 9.4862
water at 110°C = 0.0525

Percent loss BB — C+C & ignit = 9.4862 gm
3.83% — after = 9.4116
loss BB = 0.0746

Alk. Carb. fusion. — wt air dry = 1.0211 gm.
Decided Manganese reaction. — wt dry at 110°C = 0.9944
Pink color with acid.

SiO_2 = 79.49% — wt SiO_2 = 0.79052 gm.

Tot Al
12.14% = wt $Fe_2O_3 + Al_2O_3$ = 0.1208
3.43% Fe_2O_3 — wt Fe_2O_3 = 0.0342
8.71% Al_2O_3 — wt Al_2O_3 = 0.0866

Percent Mn_3O_4 = 2.44% wt Mn_3O_4 = 0.02432 gm

Résumé of 365

OK BDS

Silica	79.49	per cent.
Alumina	8.71	" "
Ferric oxide	3.43	" "
Manganese red oxide	2.44	" "
Lime		" "
Magnesia	2.10	" "
alkalies	by difference	" "
Loss on ignition	3.83	" "
Total	100.00	97.90

(By Wash) — air dry sand in air dry clay 33.40

365 – 25 grams air dry for sand
(wm Kenney) wt sand air dry = 8.36

33.40

835.00
25
75
835
100

Lab no 37 — Redetermination of alkalies.
wt air-dried =

wt KCl + NaCl =
wt KCl =
wt NaCl =
wt K_2PtCl_6 =

Lab. No. 366. Clay marked: "Notebook 50. pg 30a, July 4th 1889. Gainesville, Greene Co, Ark.

Anal 19. R. E. Call.

25 grams for sand air dry

wt air dry sand = 8.75 grams

for water & loss BB	wt	=	2.0000 gm
9.4163 / 9.4153 Percent water 2.27%	wt C + C ht	=	9.4607
	after	=	9.4153
	water at 110°C	=	0.0454
Percent loss BB. 3.11%	C + C & ignit	=	9.4153
	after	=	9.3544
	loss BB	=	0.0609
Alk. Carb fusion	wt air dry	=	1.0285
Faint manganese reaction.	wt dry at 110°C	=	1.0052 gm
SiO_2 81.34%	wt SiO_2	=	0.81772 gm
Fe+Al = 13.38%	wt Fe+Al	=	0.13452 gm
3.67	wt Fe_2O_3	=	0.03692
9.71%	wt Al_2O_3	=	0.09760
CaO = 0.290%	wt CaO	=	0.00292 gm
	wt $Mg_2P_2O_7$	=	0.00942 gm
MgO = 0.33%	wt MgO	=	0.00339

Resume 366

Silica	81 34	per cent.
Alumina	971	" "
Ferric oxide	367	" "
Lime	029	" "
Magnesia	33	" "
Alkalies & trace Manganese (by difference)	155	" "
Loss on ignition	311	" "
	100 00	(98.445)

OK BB

Air dry sand in air dry clay 35

36b For sand 25 grams air dry
of air dry sand = 8.75 grams

35%

Lab. No. 367. Pink Clay, marked: "Notebook 50, pg 32. July 4th. 1889. Gainesville, Ark. Anal. 20. R. E. Call."

for water & loss BB.
9.4923
9.4912
Percent water 2.36%

wt = 2.0000 gm.
C+C & ht = 9.5385
after = 9.4912
water at 110° C = 0.0473

Percent loss BB 6.03%

C+C of ignit = 9.4912 gm
after = 9.3733
loss BB = 0.1179

Alkali Carb. fusion.
No manganese.

wt acidy = 1.0304
wt dry at 110° C = 1.0061 gm

Percent SiO_2 71.17% wt SiO_2 = 0.71612 gm

Fe+Al = 21.21%
2.77%
18.44%
wt Fe+Al = 0.21343
wt Fe_2O_3 = 0.02792
wt Al_2O_3 = 0.18551

0.25%
wt CaO = 0.00252 gm

Percent MgO
0.44%
wt $Mg_2P_2O_7$ = 0.01239 gm
wt MgO = 0.00446 "

Resumé 367

Silica	71 17	per cent.
Alumina	18 44	" "
Ferric oxide	2 77	" "
Lime	0 25	" "
Magnesia	0 44	" "
Alkalies (By difference)	0 90	" "
Loss on ignition	6 03	" "
Total	100.00	(99.10)

O.K. BBd

36] 25 grams air dry sand.
4 air dry sand = 3.63 grams.

14.52

25) 363.00
25
113
100
130
125
50

Lab. No. 368. Clay, marked: "Notebook 50, pg 16. From # 2 of Section.
R.R. cut, 3 mi. W of Jonesboro. (Anal. 21) R.E. Call."

Water + loss B.B. 9.3950 9.3940 9.2983	Percent water 3.37%	wt =	2.0000 gm.
		c + c of ht =	9.4608 gm
		after =	9.3933
		water at 110°C =	0.0675
Percent loss B.B. 4.42%		c + c of ignit =	9.3933 gm
		after =	9.3078
		loss B.B. =	0.0855
Alk. Carb. Fusion. faint reaction for Manganese.		wt air dry =	1.0012 gm.
		wt dry at 110°C =	0.9675 gm
SiO_2 74.65%		wt SiO_2 =	0.72232 gm
Fe_2Al = 18.09%		wt Fe_2Al =	0.17503 gm
Fe_2O_3 = 5.10 " %		wt Fe_2O_3 =	0.04942
Al_2O_3 = 12.99 %		wt Al_2O_3 =	0.12561
CaO = 0.31%		wt CaO =	0.00302 gm
Percent MgO = 0.47%		wt $Mg_2P_2O_7$ =	0.01269 gm
			0.00407

Recount 368

Silica	74 65	per cent
Alumina	12 99	" "
Ferric oxide	5 10	" "
Lime	0 31	" "
Magnesia	0.47	" "
Potash + trace of Manganese	2.06	" "
Soda		
Loss on ignition	4 42	" "
	100 00	

OK BSS

368 .25 grams sand in dry.
wt of dry sand = 8.0

32.00
25) 800.0
75
50
100
100

Lab No. 350 – Red Clay resembling a chocolate Clay; marked "Note book 100 page 75. Coll. J.C. Branner.

water 9.40 per cent. Loss B.B. 8.65 per cent

wt air dry clay = 1.0472 grams.

" dried @ 110°-115°C = 0.9487 "

Percent 39.31 } wt SiO_2 total = 0.38219 gm. = 40.28 SiO_2

Note: Some silica appeared to have gone through into the filtrate so Evaporated to dryness in large pt. dish; a brownish substance separated out on the platinum; moistened several times with hydrochloric acid, HCl, and evaporated to dryness on waterbath, then dried in air bath. An orange to brown (precipitate) substance formed, which is difficult soluble in cold water alone or in hot water containing HCl, but readily soluble in hot water alone, forming a yellow solution. Passed H_2S through acid solution, got dark brown sulphide, insoluble in ammonium sulphide, soluble in moderately strong hot nitric acid forming a light brown solution, after heating a long time loses brown color & becomes light yellow.

Made HNO_3 sol. of H_2S p. up to 250 c.c.

	Percent		
350	19.13	wt $Fe_2O_3 + Al_2O_3$	= 0.18153 grms.
	14.62	wt Fe_2O_3	= 0.04387 "
	14.51	wt Al_2O_3	=

Per cent. 2.37% wt CaO = 0.02249 grms.

Percent 0.91% wt $Mg_2P_2O_7$ = 0.02414 grms.
wt MgO = 0.00869

350 Water + loss at low Red heat with Burner wt air dry = 0.57623
wt C + 350 bfht = 20.74114
" C + 350 aft ht = 20.67444
water = 0.06670

water 11.62%

wt C + 350 bfht low red ht = 20.67444
" + " aft " " = 20.63313
Loss B. Burner low red heat 8.46% Loss at low red heat = 0.04131

Note: After igniting at low red heat became from brownish red, reddish yellow.
Before blowpipe gray with yellow tinge. somewhat zinc white volatilize on sides of crucible.

350 Resumé:

Silica	40 28	per cent	
Alumina	14.51	"	"
Ferric oxide	4 62	"	"
Lime	2 37	"	"
Magnesia	91	"	"
Potash	84		
Soda	36		
Loss on ignition	865	"	"
Total			72,57

Feb. 6, 1890. 350.-

water loss B.B. + ~~complete analysis~~ { wt air dry = 1.0027 ; " D. @ 110°-115° = 1.8855

	wt C + 350 bfht	= 21.1649	grams
	" C + 350 afht	= 21.0476	"
Water 11.69%	wt lost - water	= 1.1173	"
(N.B. Red & termine loss 13.3 B.) at low red heat.	wt C + 350 bfht B.B.	= 21.0476	"
	" C + 350 afht B.B.	= 20.9693	"
8.84%	wt lost B.B.	= 0.0783	"

For analysis (Treat with Lactic Acid): wt air dry = 1.1997 grams; wt D. @ 110°-115°C = 1.0596

Per cent. R. wt $Fe_2O_3 + Al_2O_3$ = grams

wt Fe_2O_3 = X "

1.98% R Al_2O_3 0.02102 grams.

R wt ZnO = None "

0.31% R wt CaO = 0.00329 gram. "

R wt $Mg_2P_2O_7$ = .00749 "

R .25% wt MgO = .00269 "

43.02% wt Residue (white + sandy) = 0.45082 grams

39.77% wt SiO_2 = 0.42142 ".

350. Solution. (wt SiO_2 =)

Fe and Al precip^{d} with $(NH_4)_2S$.

13.39% wt $Fe_2O_3 + Al_2O_3$ = 0.14187 grams
6.75 wt Fe_2O_3 = .07162
6.64 wt Al_2O_3 = _____

31.88% wt ZnO = 0.33779 grams
1.14% wt CaO = 0.01212 grams
wt $Mg_2P_2O_7$ = 0.01139 "
0.38% wt MgO = 0.00453 "

" " d.

Resumé of 350.

Soluble in Conc HCl	56	98	per cent
Insoluble in Conc HCl	43	02	per cent
	100	00	

Analysis:

Silica	39	77	per cent	
Alumina	6	64	+ 1.98 =	8.62
Ferric oxide	6	75	"	"
Zinc oxide	31	88	"	"
Lime	1	45	"	"
Magnesia	0	63	"	"
Potash	0	84	"	"
Soda	0	36	"	"
Loss at low red heat	8	46	"	"
Total	96	78	+ 1.98	98.76

Rn. 1.98

Resume of 350:

Silica	39	77	per cent.
Alumina	8	62	" "
Ferric oxide	6	75	" "
Zinc oxide	31	88	" "
Lime	1	45	" "
Magnesia	0	63	" "
Potash	0	84	" "
Soda	0	36	" "
Loss at low red heat	8	46	" "
	98	76	

Water @ 110°-115° C. - 11.69 %.

light gray soil, very little grit.

Lab No 382. Specimen marked: "Section 8, 11 N., 4 E., nw. ¼ of sw. ¼, Bolivar Creek. Coll A.R. Ball Notebook 51."

Water, loss & alk.

Water - 4.29%

Loss B.B. 8.75%

SiO_2 fusion

K_2O = .00600 = 0.62%

Na_2O = .00366 = 0.38%

For analysis.
(K_2CO_3 $NaCl$ fusion. No Mn.)

61.76%
26.36%
3.37%
92.91%

0.75%

0.90

Wt air dry = 1.0008 grams
" d. @ 110°-115°C = .9578 "

Wt C + 382 bfht = 19.6945 grams
Wt C + 382 afht = 19.6515 "
Water = 0.0430 "

Wt C. + 382 bfht B.B. = 19.6515 "
Wt C + 382 afht B.B. = 19.5676 "
Wt CO_2 B.B. = 0.0839 "

Wt D + NaCl + KCl = 15.8023 grams
Wt Al = 15.7859 "
Wt NaCl + KCl = 0.0164 "
Wt KCl = 0.0095 "
Wt NaCl = 0.0069 "
Wt K_2PtCl_6 = 0.03125 gram.
Wt KCl = .00955

Wt air dry = 1.0006 grams
" d. @ 110°/115°C = 0.9577 "

Wt SiO_2 = 0.59157 grams
Wt $Al_2O_3 + Fe_2O_3$ = 0.25128 grams
Wt Fe_2O_3 = 0.03187 "
Wt Al_2O_3 = _____

Wt CaO = .00719 gram
Wt $Mg_2P_2O_7$ = 0.02419 gram
Wt MgO = 0.00871 "

For P_2O_5 Trace. Air dry = 2.00025 grams.
" O.D. @ 110°/115°C =

Resumé of 382:

Silica	61.76	per cent.
Alumina	22.91	" "
Ferric oxide	3.32	" "
Lime	0.75	" "
Magnesia	0.90	" "
Potash	0.62	" "
Soda	0.38	" "
Loss on ignition	8.70	" "
Total	99.39	per cent.

Phosphoric acid Trace.

Acidigenous dark brown sand in 25 grams air dry soil
= 2.235 grams = 8.94% Percent.

Note: Seemed to be very slight eff. with HCl.

no lime appreciable

Lab. No. 383. Soil, sort of cream color marked: "July 3, 1889. City limits of Paragonia, cultivated field N.W. ¼ of section 31, 17 N., 6 E. Coll. R. E. Call." (15)

Water, loss B.B. lack.

wt air dry	=	1.0007
" D. @ 100°/150°C	=	.9779
wt D + 383 bflt	=	19.0825
" + " aflt	=	19.0597
water	=	0.0228

Water = 2.27 %

Note on quartz sinters soda has to be separated for treatment with Bi_2O_3

Loss + 383 bflt B.B.	=	19.0597
" + " aflt B.B.	=	19.0220
Loss B.B.	=	0.0377

Loss B.B. 3.85 %

Bi_2O_3 fusion.

wt D + (NaCl + KCl)	=	15.8057
wt D	=	15.7853
wt NaCl + KCl	=	0.0204
wt KCl	=	0.0085
wt NaCl		0.0119
wt K_2PtCl_6	=	0.0279
wt KCl	=	0.00852

K_2O = 0.00837 = 0.54 %

Na_2O = 0.00631 = 0.64 %

For P_2O_5 very slight efflor. with HNO_3

wt air dry	=	2.00005 grams
wt D @ 100°/150°C	=	1.95465
wt $Mg_2P_2O_7$	=	0.00619 grams.
P_2O_5	=	.00395 "

P_2O_5 = 0.20 %

383

For analysis
(Treated with HNO_3 & Aq.)

air dry = 1.0006 grams
std. @ 100°-110° C = 0.9776 "

88.13% Wt Residue = 0.86157 gram.

(On fusion showed extremely faint blue color)

76.20 %
9.35 %
1.29 %
8.06 %
0.21 %

0.30 %
7.54 %
4.47 %
3.07 %
0.52 %

0.51 %

R wt SiO_2 = 0.74502 gram.
R wt $Al_2O_3 + Fe_2O_3$ = 0.09143 gram.
R wt Fe_2O_3 = 0.01262 "
R wt Al_2O_3 = _____
R wt CaO = 0.00212 gram.
R wt $Mg_2P_2O_7$ = 0.00829 "
R wt MgO = 0.00298 "
S wt $Fe_2O_3 + Al_2O_3$ = 0.07373 gram.
S wt Fe_2O_3 = 0.04372 "
S wt Al_2O_3 = _____
S wt CaO = 0.00512 gram
S wt $Mg_2P_2O_7$ = 0.01399 gram.
S wt MgO = 0.00504 "

Or R.N.B

Resumé of 383.

Silica	76 20	per cent.
Alumina	11 13	" "
Ferric oxide	5 76	" "
Lime	0 73	" "
Magnesia	0 81	" "
Potash	0 54	" "
Soda	0 64	" "
Phosphoric acid	0 20	" "
Loss on ignition	3 85	" "
Total —	99 86	per cent.

Air dry sand in 25 grams Air dry soil = 17.33 grams
Percentage dry sand = 69.32 %
very fine white sand.

Gritty

Lab No 3854 - Light brownish Colored soil marked: "Atelocore 50, page 11. June 29/1899. Harrisburg R. 11N., 3E N.E. ¼ of N.E. ¼ of section 25. 18 inches from surface Ros. Coll. R.R. Call" (17)

Water, Loss. B.B., Alk.

wt air dry = 1.00105 grams
" d. @ 110°-115°C = .97575
wt C + 3854 bfht = 21.15765
" " afht = 21.13235
water = 0.02530

Water 2.52%

Note: Precipitate (sintered) soluble in the reagents for estimation with Bi_2O_3

wt C + 3854 bf.ht. = 21.13235
" " af.ht. = 21.08780
Loss B.B. = 0.04455

Loss B.B. 4.56%

Bi_2O_3 prin.

wt air dry = 1.0007 grams
" d @ 110°-115°C = .97575
wt C + NaCl + KCl = 15.8083 grams
" C = 15.7853 "
wt NaCl + KCl = 0.0230 "
wt KCl = 0.0113
wt NaCl = 0.0117
wt K_2PtCl_6 = 0.03725 "
wt KCl = 0.01138

K_2O = 0.0011 = 0.72%
Na_2O = 0.0062 = 0.63%

For P_2O_5

Very slight eff. apparently with HNO_3

wt air dry = 2.0006 grams
" d. @ 110°-115°C = 1.9502
wt $Mg_2P_2O_7$ = 0.00614 grams
P_2O_5 = 0.00395

P_2O_5 0.20%

For Analysis. (Treated with HNO_3 & Sn.)

Air dry = 1.0001 gram
" D. @ 110-115° C = .9749

87.39 % (to be analysed) → 75.93 %

	Wt Residue =	0.85197	gram
	R wt SiO_2 =	0.74132	"
8.83 %	R wt $Al_2O_3 + Fe_2O_3$ =	0.08618	gram.
1.19 %	R wt Fe_2O_3 =	0.01162	"
7.64 %	R wt Al_2O_3 =		
0.22 %	R wt CaO =	0.00222	gram.
	R wt $Mg_2P_2O_7$ =	0.00664	gram.
0.24 %	R wt Mg =	0.00239	"
8.32 %	S wt $Fe_2O_3 + Al_2O_3$ =	0.08113	gram
4.91 %	S wt Fe_2O_3 =	0.04792	"
3.41 %	S wt Al_2O_3 =		
0.45 %	S wt CaO =	0.00442	gram.
	S wt $Mg_2P_2O_7$ =	0.01429	"
0.52 %	S wt Mg =	0.00514	

Resume of 384

Silica	75	93	per cent
Alumina	11	05	" "
Ferric oxide	6	10	" "
Lime	0	67	" "
Magnesia	0	76	" "
Potash	0	72	" "
Soda	0	63	" "
Phosphoric acid	0	20	" "
Loss on ignition	4	56	" "
Total	100	62	(99.19)

Or Rx 3

Sandy sand in air dry clay (25 grams) = 9.34 grams
Percent air dry sand = 37.36 %
Very fine white sand.

Lab N° 385. Silty. Light colored soil. Marked: "June 22/889
Harrisburg - ½ mile west. Upper limit of cultivation
"Buckshot Soil". N.E. ¼ of N.W. ¼ of section 25, 11 N., 3 E. Depth
of soil 3½ ft. Coll. R. Cale."

Water 0.71%

wt air dry	=	1.0003 grams
" D. @ 110-115°C	=	1.9931 "
wt C + 385 after ht.	=	19.6929 grams
" + " after ht.	=	19.6857 "
water	=	0.0072 "
wt C + 385 after ht. B.B.	=	19.6857 0 "
" + " after ht. B.B.	=	19.6662 25 "
Loss B.B.	=	0.01945 "

Loss B.B. 1.95%

wt H2O + NaCl + KCl	=	14.1858 grams
wt H2O	=	14.1659 "
wt NaCl + KCl	=	0.0199 "
wt KCl	=	0.0076 "
wt NaCl	=	0.0123 "
wt K_2PtCl_6	=	0.0250 "
wt KCl	=	0.0076

Bi2O3 flush

K_2O = 0.0048 = 0.48 %
Na_2O = 0.0065 = 0.65 %

For P_2O_5

wt air dry	=	2.0003 grams
" D. @ 110-115°C	=	1.9861 "
wt ppt. P_2O_5	=	.00429 gram.
P_2O_5	=	.0027 "

P_2O_5 0.13%

385

For analysis — Wt air dry = 1.0003 grams.
" d. @ 110°/115°C. = .9931

95.03% wt Residue = 0.94377 gram.
(Note: mass showed a trace of manganese.

87.50%	Rwt SiO_2	= 0.86897 gram.
5.65%	Rwt $Fe_2O_3 + Al_2O_3$	= 0.05612 gram.
1.09%	Rwt Fe_2O_3	= 0.01092 "
4.56%	Rwt Al_2O_3	=
0.20%	Rwt CaO	= 0.00202 gram.
	Rwt $Mg_2P_2O_7$	= 0.00429 "
0.15%	Rwt MgO	= 0.00154 "
3.14%	Swt $Fe_2O_3 + Al_2O_3$	= 0.03122 gram.
1.60%	Swt Fe_2O_3	= 0.01592 "
1.54	Swt Al_2O_3	=
0.43%	Swt CaO	= 0.00432 gram.
	Swt $Mg_2P_2O_7$	= 0.00584 gram.
0.21%	Swt MgO	= 0.00210 gram

Resumé of 385:

Silica	87.50	per cent.
Alumina	6.10	" "
Ferric oxide	2.69	" "
Lime	0.63	" "
Magnesia	0.36	" "
Potash	0.48	" "
Soda	0.65	" "
Phosphoric acid	0.13	" "
Loss on ignition	1.95	" "
	100.49	per cent

Of R.N.B

Sandy land in air dry soil (25 grams) = 19.37 grams
Per cent air dry sand = 77.48
Very fine white sand.

Somewhat gritty.

Lab. № 386 – Pink stratified specimen marked: "Pipe book 51, p. 19, June 11, 1889. Ochre, Wittsburg. Coll. R. E. Call."

For water loss B.B. & Alk.

wt air dry =
" d. @ 110°-115° C =

Water, loss B.B. & Alk.

wt air dry = 1.0003 grams
wt d. @ 110°-115° C = 0.9778 "
wt C + 386 bf ht. = 21.1535 grams
" + " af ht. = 21.1330 "
Water = 0.0225 "
Water 2.24%

wt C + 386 bf ht. B.B. = 21.1330 "
" " + " af ht. B.B. = 21.0770
Loss B.B. = 0.0560
Loss B.B. 5.72%.

Bi_2O_3 fusion.

wt D + NaCl + KCl = 15.8024 "
wt D = 15.7850 "
wt NaCl + KCl = 0.0174
wt KCl = 0.0081
wt NaCl = 0.0093
K_2O = .00511 = 0.52%
Na_2O = .00493 = 0.51%
wt K_2PtCl_6 = 0.0266
wt KCl = 0.0081

For P_2O_5.

wt air dry = 2.0002 grams.
" d. @ 110°-115° C = 1.9554 "
wt Mg$_2P_2O_7$ = 0.00639
P_2O_5 = 0.00408

P_2O_5 = 0.20%

For analysis
(Treated with HNO_3)

Grain dry = 1.0002 grams.
" d. @ 110-115°C = 0.9778 "

87.08% wt R = 0.85152 gram (Total)
69.53% R wt SiO_2 = 0.68072 gram.
15.98% R wt $Fe_2O_3 + Al_2O_3$ = 0.15633 gram.
2.17% R wt Fe_2O_3 = 0.02129 "
13.81% R wt Al_2O_3 = _____
0.06% R wt CaO = 0.00059 gram.
7.32% Snt $Fe_2O_3 + Al_2O_3$ = 0.07162 gram
5.93% Snt Fe_2O_3 = 0.05802 "
1.39% Snt Al_2O_3 = _____
0.52% Snt CaO = 0.00517 gram.
Snt $Mg_2P_2O_7$ = 0.01059 "
0.38% Snt MgO = 0.00381 "

R wt $Mg_2P_2O_7$ = 0.00619 gram
0.59% R wt MgO = 0.00583

Resume of 386

Silica	69 53	per cent.
Alumina	15 20	" "
Ferric oxide	8 10	" "
Lime	0 58	" "
Magnesia	0 97	" "
Potash	0 52	" "
Soda	0 50	" "
Phosphoric acid	0 20	" "
Loss on ignition	5 72	" "
Total	101 34	(99.79)

OK
R.N.B

Fine white air dry sand 42 2.5 grams air dry ochre
= 6.37
= 25.48%

Lab. No 387. Yellowish soil, apparently no grit, marked: "July 23, 1889. One mile S.E. of Mariana. N.W. 1/4 S.E. 1/4 of section 24, 24, 3 E., Col RE. Cale" (12)

Water, loss B.B. & ack.

Wt air dry = 1.0007 grams
" d. @ 110°-115°C = 0.9753 "

Water 2.53%

Wt C+387 bf ht = 19.6915 grams
" + " af ht = 19.6661 "
Water = 0.0254 "

Loss B.B. 3.18%

Wt C+387 bf ht B.B. = 19.6661 "
" + " af ht B.B. = 19.6350 "
Loss B.B. = 0.0311

Bi_2O_3 fusion (Sintered do not have to powder - fuses from)

Wt O + NaCl + KCl = 14.1925 grams
of O = 14.1658 "
Wt NaCl + KCl = 0.0267 "
Wt KCl = 0.0115
Wt NaCl = 0.0152
Wt K_2PtCl_6 = 0.0378 gram.
Wt KCl = 0.0115

K_2O = .00726 = 0.74%
Na_2O = .00856 = 0.82%

For P_2O_5

Wt air dry = 2.0002 grams
d. @ 110°-115°C = 1.9496

P_2O_5 = 0.30% Wt $Mg_2P_2O_7$ = 0.00924 Wt KCl = .00591

For Analysis

Wt air dry = 1.0005 grams.
Wt d. @ 110°-115°C = 0.9752 "

Wt R = 0.86852 grams.

75.46%
10.06%
1.69%
8.37%
0.47%
0.58%

Rnt SiO_2 = 0.73597 gram
Rnt Fe_2O_3 + Al_2O_3 = 0.09812 gram.
Rnt Fe_2O_3 = 0.01649 "
Rnt Al_2O_3 =
Rnt CaO = 0.00459 gram.
Rnt $Mg_2P_2O_7$ = 0.01449 gram
Rnt MgO = 0.00522 "

7.30% Sol Fe_2O_3 & Al_2O_3 = 0.07127 gram
5.38% Sol Fe_2O_3 = 0.05249 "
1.92% Sol Al_2O_3 = _____

0.53% Sol CaO = 0.00519 gram.
Sol $MgNH_4PO_4$ = 0.02239 gram
0.82% Sol MgO = 0.00806 "

Resumé of 387:

Silica	75	46	per cent
Alumina	10	29	" "
Ferric oxide	7	07	" "
Lime	1	00	" "
Magnesia	1	36	" "
Potash	0	74	" "
Soda	0	82	" "
Phosphoric acid	0	30	" "
Loss on ignition	3	18	" "
	100	22	(98.86)

OK R.N.B

Very fine white air dry sand in air dry soil
= 18.1 grams in 25 grams soil
= 72.4%

Dec 20, 1890.

Labna #73 for Alumina. J. C. Branner

#73 air dried = 0.5049 grams

68.62% #73 SiO_2 = 0.34652 grams.

23.85% #73 $Al_2O_3 + Fe_2O_3$ = 0.12039 grams.

#73 Fe_2O_3 =

Reqd = cc $KMnO_4$

1 cc $KMnO_4$ = grams Fe.

Before washing spec. nearly white — when moist dirty white with tinge of pink. After washing pinkish white; burned nearly white, still a little pink.

#73 Label: Specimen washed; the washings dried on water bath; dried washings washed in mortar and weighed into crucible. Then in air.

	#73 air dried washings =	0.5121 grams.
	" dr @ 110°-115°C =	0.5080
	#73 Cruc + a.d.s. bf. ht. in air bath =	18.9155
	" + " af " " " =	18.9114
0.80%	#73 wat. lost at 110°-115°C =	0.0041
	#73 Cruc + a.d.s. bf ht. B13 =	18.9114
	" + " af " " =	18.8433
13.40%	#73 lost on ignition	0.0681

48.62 #73 SiO_2 = .24703

35.26 + 1.74 #73 $Al_2O_3 + Fe_2O_3$ = 0.19439 grams.

Fe_2O_3 = .00886 Gram

36.52

Resumé — Spec. dried at 110°-115°C gave:

Silica	48.62	per Cent.
Fe_2O_3	1.74	
Alumina	36.52	" "
Water (loss on ignition)	13.40	" "
Total	100.28	" "

Water @ 110°-115°C — 0.80 per cent.

R. Call. Specimen was one marked:
"Natchez 51 / E. J. A. June 1889.
Bottom of Spence Creek, 1 mi. N. of Harris-
burg. Sec. 18, 11 N., 4 E. SW 1/4 of SE 1/4
Lodge Coll. R. E. Call."

Feb 1890

Determine whether
Calc. spar ___ not carbonate.
Limonite ___ " limonite
Silic. iron ore ___ or ferruginous sandstone.

Note reaction for manganese decided
but not very strong.

107
~~393~~ Sp gr.
W = 0.3565
K = 40.8315
W' = 41.0435

$$\frac{W}{W+K-W'}$$: Sp. gr. 2.46

Ref. B

Jan. 2, 1891. 55 $KMnO_4$ - for Fe.
of Fe - piano wire taken = 0.3756 gram.
× .998 =
Req'd cc $KMnO_4$
∴ 1 cc $KMnO_4$ = gram Fe

Jan 3, 1891 Testing standard solution of $KMnO_4$
of piano wire taken =
× .998 =
Req'd cc $KMnO_4$
∴ 1 cc $KMnO_4$ = gram Fe

Lab no 393. White specimen (Kaolin) — Marked:

"Notebook 99 page 23. Feb 2, 1899.
Sec. 19, 8S., 24 W. (air dried). Cole JCB"

For water, lose BB crack. wt air dry = 1.0001 grams
wt @ 110°-115°C = 0.9900 "

wt C + 393 bf. ht. = 21.1437 grams.
wt C + 393 aft ht. = 21.1336 "
Water 1.00% wt water = 0.0101

wt C + 393 bf. ht. = 21.1336 grams.
wt C + 393 af. ht. = 20.9960
Loss ignition 13.89% wt lost ignition = 0.1376

Bi_2O_3 fusion.

wt D + NaCl + KCl = 14.1761
wt D = 14.1655
K_2O = .00202 = 0.20% wt KCl + NaCl = 0.0106
Na_2O = .00392 = 0.39% wt KCl = 0.0032
wt NaCl = 0.0074
wt K_2PtCl_6 = 0.0106
wt KCl =

For analysis (No Mn_3O_4)

wt air dry = 1.0186 grams
wt @ 110°-115°C = 1.0086

47.00% wt SiO_2 = 0.47409 grams.
*40.86% wt $Fe_2O_3 + Al_2O_3$ = 0.41209 gram
2.31% wt Fe_2O_3 = 0.02333
wt Al_2O_3 =
0.32% wt CaO = .00329 gram
wt $Mg_2P_2O_7$ = trace
wt MgO =

*Refuse Al_2O_3 & Fe_2O_3 — wt after refusion = 0.40621 gram 40.27%
*2nd Refusion " " " = 0.37299 " 36.98 "

~~5.24% Residue insol. in KHSO4 = 0.05527~~
~~$Al_2O_3 + Fe_2O_3$ in R. insol. KHSO4 = .0.02844~~
Fe_2O_3 =

393 Redetermination of Silica:

Wt air dry = 1.0050 gram.

Wt @ 110-115°C = 0.995

47.39% Wt SiO_2 = 0.47137 grams.

after treatment with HF wt residue = .00847

= 0.85% ∴ SiO_2 = 47.39 − .85 = 46.54%

Wt residue from SiO_2 after treatment with HF — after treatment filtrate = 0.00847 gram

Residue from SiO_2 after treatment with HF fused with Na_2CO_3 / K_2CO_3 — extracted with water { a. Residue b. Filtrate

(a) Filtrate aq. Sol. } evap. & dep. SiO_2

(b) Residue HCl Sol. } " " "

Wt SiO_2 (a) (b) =

40.44% Wt $Al_2O_3 + Fe_2O_3$ = .40239 grams.

Wt Fe_2O_3 = _____

On fusion in nickel cup, with KOH — dissolving in water, filtering dissolving residue in HCl, ppt. with $(NH_4)_2S$ — filtering, filtrate from from nickel.

Resumé of 393.

Silica	47.39	per cent	46.54
Alumina	34.67	" "	34.3
Ferric oxide	2.31	" "	1.55
Lime	0.32	" "	0.32
Magnesia	trace	" "	trace
Potash	0.20	" "	0.20
Soda	0.39	" "	0.39
Loss ignition	13.89	" "	13.89
Total	99.17	" "	
water @ 110°-115°C	1.00	per cent	

Theory for ordinary kaolin. Found

(2) SiO_2 = 46.50% 47.39 %

Al_2O_3 = 39.57% 34.67

(2) H_2O = 13.93% 13.89 1

100.00

See p. 62 for Fe_2O_3 redet.

3H 9

Notes on analysis

At low red heat gave off some white fumes that appeared to have an acid reaction & smelled somewhat like SO_3.

Aq. Sol. No reaction in aqueous extract for Zn or H_2SO_4 – hence no soluble sulphate present.

Fusion. A fusion with $\begin{cases} K_2CO_3 \\ Na_2CO_3 \end{cases}$ gave no reaction for Barium or Lead, & a small reaction for sulphuric acid not much more than could be accounted for on the impurity of HCl & carbonate.

No reaction for zinc or fe with cobalt nitrate.

No evidence of fusion or any change of color on ignition.

69

	Al_2O_3	:	SiO_2	:	H_2O	:	H_2O of Expt
Suppose	35.27		39.09		22.89		5.44
	0.34	:	0.65	:	1.27	:	0.30
or	3	:	6	:	12	:	3
or	1	:	2	:	4	:	1

Sp. gr. $w = 0.27465$ gms. $\quad \frac{w}{w+k-w'} = sp\ gr$

$w' = 40.9767$ "

$k = 40.8374$ "

$$\frac{0.27465}{0.27465 + 40.8374 - 40.9767} = 2.029$$

Sulph. 54

$Al_2O_3 \cdot 2SiO_2 \cdot 4H_2O$

Analyses.

	Theory		II Found	I Found	
(2) SiO_2	40.82	per cent	39.09	38.86	%
Al_2O_3	34.72	" "	35.27	35.20	"
(4) H_2O	24.46	" "	22.89	23.69	"
	100.00				

Ferric oxide	0.51	0.21	*
Lime	0.54	0.31	
Magnesia	trace	..	
Potash	0.99 } 1.72	} 1.73 (by diffrn)	
Soda	0.73 }		

Special analysis of 349.

by R.B.S.

349.

For water, loss B.B. calc. Wt air dry = 1.0008 grams

	Wt d @ 110°–115°C	0.9453 "
	Wt c + 349 bfht.	= 19.0649
	Wt c + 349 afht.	= 19.0104
Water 5.44 %	Wt water	= 0.0545
	Wt c + 349 bfht loss ign heat	= 19.0104
	" + " afht " "	= 18.7976
Loss ign heat 22.51%	Wt lost ign heat	= 0.2128
	Wt c + 349 bfht B.B.	= 18.7976
	" c + 349 afht B.B.	= 18.7940
Loss B.B. 0.38%	Wt lost B.B.	= 0.0036

22.89 per cent after loss on ignition.

Bi_2O_3 fusion.

	Wt d + NaCl + KCl	= 14.1932
	Wt d	= 14.1652
	Wt KCl + NaCl	= 0.0280
K_2O = .00941 = 0.99 %	Wt KCl	= 0.0149
Na_2O = .00695 = 0.73 %	Wt NaCl	= 0.0131
	Wt K_2PtCl_6	= 0.0489
	Wt KCl	= 0.0149

For analysis. Wt air dry = 1.0015 grams.

Wt d @ 110°–115°C = 0.94702 "

40.22 %	Wt SiO_2	= 0.38092 grms.
35.48 %	Wt $Al_2O_3 + Fe_2O_3$	= 0.33609 gram
.51 %	Wt Fe_2O_3	= 0.0047[2]
34.97	Wt Al_2O_3	= 33137
0.84 %	Wt CaO	= .0819 gram
	Wt $Mg_2P_2O_7$ =	
	Wt MgO =	

3.56% [1st Wt fnd] Wt residue from first after treat = with HF = .0337

[2nd Wt fnd] " " Part. Residue after treat = " " = .0341[2]

SiO₂ 51%

due to impurities from H_2SO_4

Test for Zn + Mn — No manganese (no reaction on fusion) — No Zinc — no reaction on fusion & Cobalt nitrate — no zinc in wet way

Take iron in first as more nearly correct.

(by difference)

3249 Residue from SiO_2 treatment with HF fused with $\begin{cases} Na_2CO_3 \\ K_2CO_3 \end{cases}$ — taken with water — filter —

{ a. Residue
{ b. Filtrate

{ Note when fusing, most of R pm SiO_2 seemed to be insoluble in the carbonates.

(a) No Barium found in (a) or (b)

~~H_2S~~ precips. small dark brown. at first only brownish coloration on boiling separates

Sp-gr. determination.
W = 0.27465 grams. $\frac{W}{W+K-W'}$ of fK = 40.8315
K = 40.83714 "
W' = 40.99325
0.27465 = 2.31 Sp gr.
27465+40837+-40099325
Sp-gr = 2.43
Mean Sp gr = 2.37

Wt SiO_2 (at b) =

(b) ~~No~~ precips H_2S small dark brown. — at first only brownish coloration on boiling separates.

6a

See page

Resumé of 3249.

	Silica	39.09 per cent.
	Alumina	35.27 " "
	Water (loss on ignition)	22.89 " "
*	Ferric oxide	0.21 " "
	Lime	0.54
	Magnesia	trace
	Potash	0.99 " "
	Soda	0.73 " "
		99.72 per cent

* Taking Fe_2O_3 in first determination as more correct than 0.51% of second.

* Taking 2 × 0.85 (see 3923) as impurity Silica = 40.22 — (3.15 − 1.70) = 40.22 − 1.45 = 39.37. Then Mean of 2 = 39.09

Some Sand Determinations

Lab No 71.

air dry spec. 25 grams.

" air dry sand = 1.91 grms.

= 7.64 per cent

Extremely Keyfine white sand

Lab. No. 264.

air dry spec. = 25 grams.

air dry sand = 14.48

= 57.92 per cent.

Extremely Key fine dark sand

Lab No 184.

air dry spec. = 25 grams.

air dry sand = 5.47

= 21.88 per cent.

One large angular frag. rest extremely fine white sand

Lab. No. 332.

air dry spec. = 25 grams

air dry sand = 2.18

= 8.72 per cent.

Extremely fine nearly white sand

Lab No 329

air dry spec. = 25 grams.

air dry sand = 6.6 grms.

= 26.4 per cent.

Fine white sand.

Lab No 343

air dry spec. = 25 grams

air dry sand = 13.52

= 54.08 per cent.

Extremely fine white sand

Lab No 329

air dry spec. = 25 grams

air dry sand = 5.51

= 22.40 per cent.

Extremely fine ~~partly dark~~ ~~partly~~ white sand

Lab No 343

air dry spec = 25 grams

air dry sand = 5.47

= 21.88 per cent.

Extremely fine partly dark partly white sand

Lab No 286

air dry spec. = 25 grams

air dry sand =

= per cent.

Sand

By R n B

Experiment on Determination of Graphite in 1051 J.B.Comstock.-
According to method of J.B.Mackintosh
The School Mines Quarterly Jan. 1883. p. 159
Which consists in fusing the material fine or coarse, with KOH - dissolving in cold water - washing residue with water, ammonia & hydrochloric - in cold water, HCl, NH_4OH - the last to remove silica of New crucible taken up. Finally wash with water, dry & ign. The residue is collected in Gooch crucible.

1051 - of J.B.C wt air dry = 1.0005 grms
quite coarsely powdered -

(I) wt Gr. + Graphite = 22.6594
wt Graphite = 22.5851
wt Graphite = 0.0743

7.42% of Graphite.

II 1051. wt air dry = 1.0016 grms.

wt J.C + G = 22.8319
wt Gr. = 22.6594
17.22% wt Graphite = 0.1725

These results from 2 portions coarsely powdered taken at random from a large sample.

III 1051 of J.B.C wt air dry = 1.0006 grams
note (Spec. finely powdered, well mixed - & III & IV weighed out.)

wt C + G = 22.8325
wt C = 22.5774
25.49% wt Graphite 0.2551

Graphite Continued

IV 10 gr of IBC at air dry = 1.0000+ grams.

wt C. G = 23.1984
wt C = 22.8325
wt Graphite = 0.3659

36.56%

Soak-Take portion rendered as before & from same lot as III & IV -

V 10 gr. at air dry = 0.5000 grams.

wt C + G =
wt C =
wt G = No graphite practically

Heated for 20 mins about melting pt. of KOH with occasional stirring. Then 15 mins. near boiling pt KOH with constant stirring.

VI 10 gr at air dry = 0.5000 grams.

wt C + G =
wt C =
wt G = No graphite practically

Heated same as with V. Fused mixed a little wt of KOH in V & VI for fusing

Special - Loss in wt from III & IV on ignition - burning off all graphite.

wt C + G III & IV before = 23.1984 grams.
" " " after = 22.5838
Loss wt = 0.6146

30.71

wt air dry III & IV = 2.0010 grams.

∴ Per cent Graphite = 30.71%
Mean % Graphite in III + IV = 31.71 %
" " " " " " Corr for Res = 31.40 %

Now: wt C + Resid. not G = 22.5838
wt C = 22.5774
+ Residue 0.0064

0.31%

So 30.71 %
31.40 "
Difference 0.69 %

Ans

Graphite experiments.

VII 1051 wt air dry = 0.5000 Gram.

wt C + G = 22.6115

wt C = 22.5500

12.30% wt G = 0.0615

Heat 15 ms. just @ melting pt of KOH

~~then 5 ms.~~ ~~a little higher~~. One stick KOH. a very little white sand appeared on filling

VIII 1051 wt air dry = 0.4795 Gram.

wt C + G = 22.6931 Grams

wt C = 22.6115 "

17.01% wt G = 0.0816 "

Heat as in VII. Lamp kept just same height ~~as in VII~~. 1 stick KOH. a very little white sand.

Treated each one with water filtered by decantation + washed 2x, then heated with rather conc HCl decanted, then with somewhat dil. HCl, filtered washed thoroughly dried @ 130°-140° C - weighed.

Control: wt C + G before Burning. = 22.6931

" " " after " " = 22.6080

8.68 wt lost = Graphite = 0.0851

wt air dry material 0.9795 grams.

Mean of VIII + VII in Graphite 14.655 %

" " " " " " Cor for Resins 8.73 "

By Burning " 8.68 "

G. O. Railey's well Sec. 34, 16S, 20W.

Light brown 75 grms air dry gave air dry sand

Sept. = %

color.

107

Teale No 107 — 14 miles S. Hot Springs. Ark.

For water loss @ red heat, load BB's + C

wt air dry = 1.0007 grams.
wt dried @ 110°-115°C = .9178 "

wt C + 107 bf ht = 21.1413 grams
wt C + 107 aft ht = 21.0579 "
wt lost @ 110°-115°C = 0.0834 "

water 8.33 %

wt C + 107 bf ht red heat = 21.0579
" + " aft " " " = 20.9907
Loss @ red heat = 0.0672

Loss red heat 7.32 %

wt C + 107 bf ht BB = 20.9907
wt C + 107 aft ht BB = 20.9870
Loss BB = 0.0037

Loss BB 0.40 %
Total loss ignition 7.72 %

K_2CO_3
Na_2CO_3 } fusion
52.88 %

wt SiO_2 = 0.48512

35.76
.25
35.51

wt $Fe_2O_3 + Al_2O_3$ = 0.32809 grams
wt Al_2O_3 = _____

Theory for $Al_2O_3 . 2SiO_2 . H_2O$

(2) SiO_2	49.98 %
Al_2O_3	42.52 "
H_2O	7.49 "

Found

52.88 per cent.
per cent.
7.72 per cent.

Resume'

SiO_2	52.88
Al_2O_3	35.51
Fe_2O_3	0.25
CaO	0.45
MgO	0.51
K_2O	0.26
Na_2O	2.83
	92.69
H_2O	7.72
	100.41

R.N.D.

Theory

SiO_2	48.47
Al_2O_3	32.56
water	15.41

Notes on Experiment (13)

May 9th/890 In the Case of a mantle (I) did not seem to have undergone much if any change, while II had turned very much darker & redder. Now the colors are I yellowish brown — II reddish brown — with much red. Rub If any change has taken place in I it has grown lighter in color.

Experiments with $Fe(OH)_3$ – looking to formation of $Fe_2O_3 \cdot H_2O$ (Göthite), and Fe_2O_3 at the ordinary temperature.

Iron wire dissolved in HCl, HNO_3 added & Solution boiled till all $FeCl_2$ – was ferric state. Solution cooled & precip^d with ammonia – washed by decantation & following two Experiments tried.

I. $Fe(OH)_3$ treated with 350 c.c. distilled water, flask corked & set in room away from fire. Occasionally shaken up to insure contact with water.

April 7th 1890 3.50 P.M. experiment begun.

In a few months – and at end of a year – Chocolate

II $Fe(OH)_3$ – treat with 350 c.c. of a Solution consisting of

NaCl	13.22 grams	✓
KCl	0.38 "	✓
$MgCl_2$	1.58 "	✓
$MgSO_4$	1.04 "	✓
$CaSO_4$	0.67 "	✓
$CaCO_3$	0.02 "	✓
NH_4Cl	2 Drops Solution	✓

in 500 c.c. distilled water.

Flask ½ Liter Erlenmeyer – corked Set with I. Occasionally shaken up.

April 7, 1890. 3.55 P.M. Experiment began.

At end of a year brownish – dark – red.

393. For Iron. wt air dry = 0.69775
wt D@110°-115°C = 0.69078

1.559% wt Fe_2O_3 = .01072 grams.

394. Pink spec. G.O. Railey sample
Washed out sand & dried clay at 110°-115°C
wt dried @ 110°-115°C = 4.3549 grams.

Dec. 5789% Rail

wt C + 3g + O @ (110°-115°C) = 24.0070
wt C = 20.0736
wt 394 dried B.B. = 3.9334

wt 394 d. 110°-115° = 4.3549
" d. B.B. = 3.9334
wt loss 313. = 0.4215

Hence 9.67% loss on ignition

3 Creaw Thiessieves.

			per cent
Stopped on	40 mesh 2 wires	.0005 gt	0.005
" "	60	.002	0.020
" "	80	.005	0.052
" "	100	0.100	1.043
" "	150	.330	3.327
Wt thro all		9.130	95.436
Total		9.5875	99.883

Lab No 3904 Specimens of clay
from
G.O. Railey's well
W½ of NE¼
E½ of NW¼ } Sec 34, 16 S., 20 W.

From J.C.B.

Sand Determinations

1. Brown — 25 grams air dry clay
gave Extremely fine particles partly brown air dry sand = 7.23 gm.
= 28.92 %

no eff. with HCl

2. Pink — 25 grams air dry clay
gave fine white air dry sand = 7.27
= 29.08 %

No Eff with HCl.

3. Cream — 25 grams air dry clay
gave Extremely fine Cream colored air dry sand = 9.86
= 39.44 %.

RNR

1. Brown Passed thro' Sieves:

		wt	Per cent
Stopped on	40	.007 grams	0.028
" "	60	.006 "	0.084
" "	80	.010 "	0.140
" "	100	.039 "	0 547
" "	150	.075 "	1 056
went thro all		6.970 "	98 141
	Total	7.102	99 996

2 Pink thro Sieves

		wt	Per cent
Stopped on	40	.004	0.052
" "	60	.085	1.122
" "	80	1.500	19 807
" "	100	2.710	35 785
" "	150	1.285	16.967
went thro all		1.989	26 264
	Total	7.573	99 .997

Perrine.

Labno 504 Spgr. 121 Manganese. Kottmann

wt. air dried	=	1.0025
wt. in water	=	0.7336
Loss in water	=	0.2689

wt Bot+w+SO4 = 40.9219
wt Bot+w = 40.1883
0.7336

.2689) 1.00250 (3.72 Rutile
8067
19580
18823
7570 anatase 1.91

Iron Ores.

Lead № 395. Reddish brown to black & dense
(Göthite). Oolitic. Powder brown - reddish brown
marked: "N.W. ¼ of section 1, 2 S., 14 W.
Saline County Coll. J.C. Branner.".

For water. wt air dry = 1.0016 grams.
wt C + 395 bf ht = 9.1499 "
wt C + 395 af ht = 9.1347
1.51% wt water @ 110°-118°C = 0.0152

For Iron & silica wt air dry = 1.0002 grams.
Fused with Na_2CO_3 / K_2CO_3 wt dried @ 110°-118° = 0.9851
No Mn. 1.99% wt SiO_2 = 0.01962 grams.
made up to 500 cc.

(1) 50 cc. req'd 8.75 cc. $KMnO_4$
(2) 50 cc. " 8.70 cc $KMnO_4$
(3) 50 cc. " 8.72 cc. $KMnO_4$
3) 26.17
8.723 = 0.54091 Fe
= 54.90%

For Phosphoric acid. wt air dry = 5.0065 grams
wt d. @ 110°-118° C = 4.9215 "
wt $Mg_2P_2O_7$ = 0.01792 grams.
wt P_2O_5 =
0.10% wt P = .00580

Resumé of 395 —
Dried @ 110°-118° gave:

Silica	1.99	per cent.
Iron	54.90	" "
Phosphorus	0.10	" "

water @ 110°-118° C. 1.51 per cent.

Iron Ores. Continued.

Lab No 396 Dense brown iron ore — powder yellowish brown (Limonite)

Marked: N.E. of S.W. of section 24, 1 N., 14 W.
Pulaski Co. Coll R. A. F. Penrose Jr.

For water — wt air dry = 1.003405
wt + 396 after = 9.0800
wt C + 396 after = 9.0681
1.18% — wt water @ 100°-110° = 0.0119

For Iron & Silica (Reaction for iron not strong.) — wt air dry = 1.005405
wt d @ 100°-110°C = 0.99359
22.48% — wt Fe_2O_3 = 0.223422 gram

Made iron up to 500 cc. —
(1) 50 cc. req 8.4 cc $KMnO_4$ =
(2) 50 cc. req 8.85 cc $KMnO_4$ =
(3) 50 cc. req 8.3 cc $KMnO_4$ = 0.53080 Fe
(4) 50 cc. req 8.7 cc $KMnO_4$ = 53.42% Fe
(5) 50 cc. req 8.45 cc $KMnO_4$ =
Mean 8.56

For Phosphoric acid — wt air dry = 5.0023
wt d @ 100°-110°C = 4.94433
wt $Mg_2P_2O_7$ = 0.08987
0.50% of P = 0.02511

Resumé of 396.

Dried @ 110°-115°C gave:

Silica	22.48	per cent.
Iron	53.42	" "
Phosphorus	0.50	
Water @ 110°-115° C.	1.18	per cent.

Iron Ores (Continued)

Lab. No. 397 – Red, ferruginous siliceous iron ore. Powder. Brown.

Marked: Iron Mt. Loc 18, 2 N., 1 E near Ca. R.R. Joliet Co.

For water — wt air dry = 1.0015
wt c + 397 after ht = 8.5240
wt c + 397 after ht = 8.5317
wt water = 0.0088
0.87 %

For Iron & Silica (Strong Mn reaction) — wt air dry = 1.0079
wt dried @ 110-115° = 0.9991
42.79 % as SiO_2 = 0.42762 gram.

Made up to 500 cc.
(1) 50 cc. req'd 5.8 cc KMnO4
(2) 50 cc. req'd 5.8 cc KMnO4
(3) 50 cc. req'd 5.7 cc KMnO4
Mean 5.76 = 0.3577 Fe
= 35.74 per cent.

For Phosphoric acid — wt air dry = 5.0029
wt @ 110°-115° C = 4.9594
wt $Mg_2P_2O_7$ = 0.02502
wt P_2O_5 =
wt P = 0.00699

Resumé of 397

Silica	42.79	per cent
Iron	35.74	" "
Phosphorus	0.14	

Water @ 110°-115° C 0.87 per cent.

Iron Ores (Continued).

Lab. No. 398 — Red brown yellow Silician ore. Bonds marked: N.W. of N.E. of sec. 6, 38, 14W. Tertiary iron ore. Coll. R.A.P. Dr. "

Dalvie Co.

For water

wt air dry = 1.00325
wt c + 398 after ht. = 8.5424
wt c + 398 after ht = 8.5262
wt water = 0.0162

1.61 %

For Iron & Silica (very slight Mn reaction)

wt air dry = 1.074655
wt d @ 110°–115°C = 1.02971

30.26 % wt SiO_2 = 0.31162 from

Made iron up to 500 cc.

(1) 50 cc reqd 6.95 cc $KMnO_4$
(2) 50 cc reqd 6.80 cc $KMnO_4$
(3) 50 cc reqd 6.80 cc $KMnO_4$ } = 0.42166 Fe
= 40.94 % Fe

For Phosphoric acid

wt air dry = 5.0017
wt d @ 110°–115°C = 4.9212

wt $Mg_2P_2O_7$ = 0.01312
wt P_2O_5 =
wt P = 0.00366

0.07 %

Resumé of 398.

Dried @ 110°–115°C gave:

Silica	30.26	per cent
Iron	40.94	" "
Phosphorus	0.07	" "

Water @ 110°–115°C — 1.61 per cent

S.S. $KMnO_4$.

I wt iron wire (piano) = 0.29125 grams
" X.998 = 0.290667 } actual wt iron wire

46.9 cc $KMnO_4$ req^{s} =
1 cc " = 0.006197 } Fe in grams.

II wt iron wire used = 0.53975 grams
X.998 = 0.53867 = actual wt.
Dissolved & made up to 200 cc.
50 c.c. req^{d} 21.7 cc $KMnO_4$
∴ .134675 grms Fe = 21.7 c.c. $KMnO_4$
∴ 1 cc $KMnO_4$ = .006205

Mean of I & II = .006197
.006205
2) .012402
.006201

∴ 1 c.c. $KMnO_4$ = .006201 grms Fe (R.N.P.)

---

349. 2nd Determination.

Silica	40 22
Alumina	35 27
water (loss. B.B.)	22 89
Ferric oxide	0 21
Lime	0 54
Magnesia	trace
Potash	0 99
Soda	0 73
	100 85

(R.N.P.)

11 lbs of F. B. Comstock

Above 24/890	For water & loss B.B.	wt air dry =	1.0005 Grams.
		wt dry @ 110°-115°C =	.9985
		wt C + 11 lbs bf ht =	9.1486
		wt C + 11 lbs af ht =	9.1466
R.B.	0.99%	wt water =	0.0020
		wt C + 11 lbs bf ht B.B. =	9.1466
		wt C + 11 lbs af ht B.B. =	9.0083
	13.85%	Loss B.B. =	0.1383

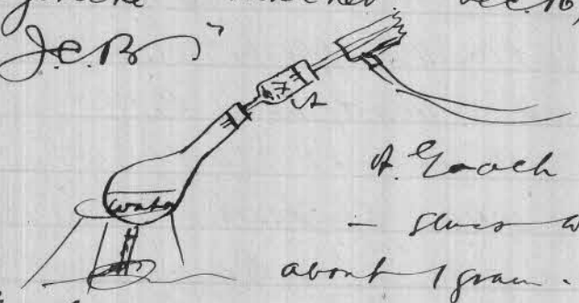
Note – Stained yellow – burned parts white, parts pink.

Arkansas Geological Survey
Little Rock
Arkansas

May 23/890

Experiment on action of Hot Water on Felspar.

Finely powdered felspar from specimen of Syenite marked "Sec 16, 25, 14 W. No 19 J.C.B."



A Coach crucible support — glass wool. felspar powdered about 1 gram. some fragments. The felspar as free as possible from other constituents of the rock.

April 1890. Distilled water through felspar for hrs.

Abandoned - above tubes.

Put water & felspar in powder & fragments into flask & boiled with water (distilled)

April 25 1890 — boiled for 2 1/2 hrs 15 hrs

April 26 1890 — " " 3 hrs.

April 28 Boiled on water bath 8.30 AM — 5 PM

" 29 " " " " 9 AM — 4 PM

Limestones — J.C. Hopkins

Lab. No. 7400. Gray crystalline limestone marked: "Mountain View road west of Batesville, section 10, 13 N., 7 W. North side of hill at Barnes' Coll. J.C. Hopkins. Notebook 72, p. 8½ August 26, 1889."

When struck gives odor of petroleum.

For water talk loss B.B.

wt air dry = 2.0080

wt d @ 110°-115°C. = 2.0061

wt C + 400 bfht = 19.7908

wt C + 400 afht = 19.7889

0.09% wt water = 0.0019

wt C + 400 bfht B.B. = 19.7889

wt C + 400 afht B.B. = 18.9150

43.56% wt loss B.B. = 0.8739

K_2O = .00398 = .198% / Na_2O = .0039 = .19% wt S + NaCl + KCl = 14.1727

wt S = 14.1639

wt KCl + NaCl = 0.0138

wt KCl = 0.0063

wt NaCl = 0.0075

wt K_2PtCl_6 = 0.0208

wt KCl = 0.0063

For P_2O_5

wt air dry = 2.0004 grams.

wt d @ 100-110°C = 1.9986

wt $Mg_2P_2O_7$ = 0.00532 grams

0.17% wt P_2O_5 = 0.00302

400

R Fe reqd 0.6 c.c. $KMnO_4$ = gram Fe = Fe_2O_3

% Fe_2O_3 =

all Fe_2O_3

Fe (vol.) = reqd 0.3 c.c. $KMnO_4$ = gram Fe = Fe_2O_3

= %

all Fe_2O_3

Limestone & Hopkins J.C.

Lab. No. 1400. For analysis. Wt air dry = 2.0016 grams.
Treat with HCl. Wt @ 110°-115° C. = 1.9998

R = 0.83% Wt residue = 0.01672 gram
0.6878% Wt SiO_2 (R) = .01377 gram
0.17% R. Wt Fe_2O_3 ~~+ Al_2O_3 none~~ = 0.00352
R Wt Fe_2O_3 = _____

R Wt CaO = none.
R Wt $Mg_2P_2O_7$ = none.
Wt MgO = _____

0.15 Wt Fe_2O_3 + (Al_2O_3) = .0030?
(Wt Fe_2O_3) none = _____

Total CaO = 1.0845 = 55.42%

50 c.c. Wt CaO = .22249 (or .22299) =
50 cc Wt CaO = .22089 / mean = .22169
(50 cc) (1) Wt $Mg_2P_2O_7$ = .00439 ~~+ 50 cc (2) =~~
Wt MgO = .00158 × 5 = .00790

Note: Ca + Mg made up to 200 c.c.
Total MgO = .00790 gram = 0.39%
(a little too high)

Résumé of 1400.

Silica	0.68	per cent
Alumina	none	" "
Ferric oxide	0.32	" "
Manganese oxide	none	" "
Lime	55.42	" "
Magnesia	0.39	" "
Phosphoric acid	0.17	" "
Potash	0.19(8)	" "
Soda	0.19(7)	" "
Loss on ignition (Carbon. dioxide & volatile matter)	43.56	" "
Total	100.92	" "
Water @ 110°-115° C.	0.09	per cent.

O.C.
R.K.

June 14, 1890 9.20 am

Limestones Hopkins

Lab No. 401. Rec Crystalline limestone, marked: "Note book 72, page 54. Sept. 3 1889. S.E. ¼ of S.E. ¼ of Section 6, 15N., 11W. In hallow on south side of North Sycamore Creek. Stone Co. Coll. C.C. Hopkins" (8)

For water, loss B.B. & alk.

wt air dry = 2.0084 ✓
wt @ 100°-110°C 2.0045 ✓

	wt C + 401 bfht	22.1218
	wt C + 401 aft	22.1179
0.19%	wt water	0.0039
	wt C + 401 bfht B.B.	22.1179
	wt C + 401 aft B.B.	21.2926
41.17%	wt loss B.B.	0.8253
	wt H2O + NaCl + KCl	15.8052
	wt H2O	15.7846
	wt KCl + NaCl	0.0206
Na_2O = .00583 = 0.29	wt KCl	0.0096
K_2O = .00606 = 0.30	wt NaCl	0.0110
	wt K_2PtCl_6	1.0316 grams
	wt KCl	.0096

For P_2O_5

wt air dry = 2.0010 ✓
wt @ 100°-110°C = 1.9972 ✓

	wt $Mg_2P_2O_7$	= 0.00803
0.25%	wt P_2O_5	= 0.00513

R. Fe req'd 1.4 cc $KMnO_4$ = .00868 Fe = .01268 Fe_2O_3
= 0.63 % Fe_2O_3.

Fe solution req'd 5.3 cc $KMnO_4$ = .03285 Fe = .04695 Fe_2O_3
= 2.35 % Fe_2O_3

Lab no. 7401. For Analysis Wt air dry = 2.0004
Dissolve in HCl Wt @ 110°-115°C. 1.9966

3.23%	Wt Residue	= 0.06462 grams.
1.94%	Wt SiO_2 (R_2)	= 0.03882 "
1.10%	R wt $Fe_2O_3 + Al_2O_3$	= 0.02197 grams.
0.63%	R wt Fe_2O_3	= 0.01268
0.47%	R Al_2O_3	
	R wt CaO	= trace
	R wt $Mg_2P_2O_7$	= undetermined.
	R wt MgO	=
(50 c.c.)	Wt CaO	= .20839 grams
(50 c.c.)	Wt $Mg_2P_2O_7$	= 0.00569
	Wt MgO	=

Note: Ca, Mg make up to 250 cc

2.50(5)%	Wt $Fe_2O_3 + Al_2O_3$	= 0.05002
2.35	Wt Fe_2O_3	= 0.04695
0.15	Al_2O_3	

(50 c.c.) CaO = .20759 Mean = .20799 (Total CaO = 1.03995) = 52.03%
(50 c.c.) $Mg_2P_2O_7$ 2:00569
MgO Total = .01025 = 0.51

(OK) R wt PO

Résumé of 7401

Silica	1 94	per cent.
Alumina	0 62	" "
Ferric oxide	2 98	" "
Manganese oxide	none	" "
Lime	52 03	" "
Magnesia	0 51	" "
Phosphoric acid	0 25	" "
Potash	0 30	" "
Soda	0 29	" "
Loss on ignition (Carbon dioxide + volatile matter)	41 17	" "
Total	100 69	per cent.
water @ 110°-115°C	0 19	per cent.

(June) June 14. 1890 10:30 A.M.

Limestones Hopkins

Lab No. 402 Gray fine grained Carb. limestone marked: "Notebook 72, page August 24, 1889.

(15) Allen's quarry. middle of Section 4, 13 N., 6 W. Col. J. Hopkins" when struck strong odor of petroleum.

For water, loss B.B. tack.

wt air dry = 2.00805
wt dry @ 110°-111°C = 2.0069 ✓

wt C + HO2 bfht. = 19.78705
wt C + HO2 afht = 19.78590
0.057% wt water = 0.00115

wt C + HO2 bfht B.B. = 19.7859
wt C + HO2 afht B.B. = 18.9203
43.13% wt loss B.B. = 0.8656

wt H + KCl + NaCl = 14.17210
wt H = 14.16375 ✓

K_2O = .00295 = 0.14% | wt KCl + NaCl = 0.00835
Na_2O = .00195 = 0.09% | wt KCl = 0.00467
wt NaCl = 0.00368

wt K_2PtCl_6 = .0153 grams.
wt KCl =

For P_2O_5

wt air dry = 2.0003 grams.
wt dry 110°-111°C = 1.9992 ✓

wt $Mg_2P_2O_7$ = .0031
0.10% wt P_2O_5 = .00202

R Fe req'd 0.4 cc $KMnO_4$ = Fe = Fe_2O_3
= % Fe_2O_3
all Fe_2O_3

Fe (tol). req'd 0.85 cc $KMnO_4$ = Fe = Fe_2O_3
= % Fe_2O_3.
all Fe_2O_3

Limestones – Hopkins

Lab No 402. For analysis Wt air dry = 2.0027
Treat with HCl. Wt @ 110°-115°C = 2.0016

1.68% Wt Residue = 0.03372 gram.
1.61% Rwt SiO_2 = .03232
0.05% Rwt $Fe_2O_3 + Al_2O_3$ = 0.00112
R wt Fe_2O_3 = ———
Al_2O_3 none
Rwt CaO = ~~trace~~.
Rwt $Mg_2P_2O_7$ = ~~trace~~ undetermined
R wt MgO = ———

(wt CaO = Mean CaO = .22087
wt $Mg_2P_2O_7$ = Mean CaO = 1.10431 = 55.17%
wt MgO = ———

50 cc wt CaO = .22177 gram.
" wt $Mg_2P_2O_7$ = ~~trace~~ MgO =
" CaO = .21997
" $Mg_2P_2O_7$ = ~~trace~~ MgO =

Note: made Cat Mg up to 250 cc

0.09% wt $Fe_2O_3 + Al_2O_3$ = 0.00182 gram.
wt Fe_2O_3 =
Al_2O_3 none

Résumé of 402

Silica	1.61	per cent.
Alumina	none	" "
Ferric Oxide	0.14	" "
Manganese oxide	none	" "
Lime	55.17	" "
Magnesia	trace	" "
~~Phosphoric acid~~	0.10	" "
Potash	0.14	" "
Soda	0.09	" "
Loss on ignition (Carbon dioxide & volatile matter)	43.13	" "
Total	100.38	per cent.

Water @ 110°–115°C = 0.057 per cent.

June 14. 1890. 11.15 a.m.

Limestone — Hopkins.

Lab. No 403. Pinkish limestone. Crystalline somewhat coarse, marked: Notebook 82, page 14. October 9, 1899. N.E¼ of Section 31, 15 N., 10 W. Hell Creek. Gov. Land. Mr. Col. J. Hopkins.

For

For water, alk. Black BB

wt air dry = 2.00575
wt d @ 110–115° C = 2.00455

wt C + 403 before ht = 19.7824
wt C + 403 after ht = 19.7812
wt water = 0.0012

0.059%

wt C + 403 before ht BB = 19.7812
wt C + 403 after ht BB = 18.9130
wt loss BB = 0.8682

43.31%

∴ wt H_2O + KCl + NaCl = 15.7984
wt H_2O = 15.7846
wt KCl + NaCl = 0.0138
wt KCl = 0.0034
wt NaCl = 0.0084

K_2O = .00341 = 0.17%
Na_2O = .00440 = 0.22%

wt K_2PtCl_6 = 0.0179 grams
wt KCl = 0.0054

For P_2O_5

wt air dry = 2.0034
wt d @ 110°–115° C = 2.0023

wt $Mg_2P_2O_7$ = .01537
wt P_2O_5 = .00983

0.49%

R Fe wgt 0.3 gr. cc $KMnO_4$ = .0018 Fe = .0026 Fe_2O_3
= .13% Fe_2O_3

Fe (sol.) req'd 0.4 cc $KMnO_4$ = .0024 Fe = .0035 Fe_2O_3
= 0.17% Fe_2O_3.

Limestone — Hopkins

Lab No 403 — For Analysis — Grain on .2 = 2.0012 ✓
Treatment HCl — H2O @ 110°/115°C. = 2.0000 ✓

0.41%	wt Residue	= 0.00822	
0.32(6)%	Rwt SiO_2	= 0.00652	
0.17%	R wt $Fe_2O_3 + Al_2O_3$	= .00342	
0.13(7)	R wt Fe_2O_3	= .00265	
0.04	R Al_2O_3		

R wt CaO = trace
R wt $Mg_2P_2O_7$ = trace
R wt MgO =

50 cc wt CaO = 0.22319 grams } mean CaO = .22299
" wt $Mg_2P_2O_7$ = Slight trace
" wt MgO =
∴ Total CaO = 55.74% } Total CaO = 1.11495
" wt CaO = 0.22279 } mean MgO =
" wt $Mg_2P_2O_7$ = Slight trace wt MgO = } Total MgO =

Note Made Mg of Ca upto 250 cc.

0.23(6)%	wt $Fe_2O_3 + Al_2O_3$	= .00472 grams.
0.17(7)	wt Fe_2O_3	= .00354 "
0.06	Al_2O_3	

Résumé of 403

Silica	0.32	per cent
Alumina	0.10	" "
Ferric oxide	0.30	" "
Manganese oxide	none	" "
Lime	55.74	" "
Magnesia	slight trace	" "
Phosphoric acid	0.49	" "
Potash	0.17	" "
Soda	0.22	" "
Loss on ignition	43.31	" "
Total	100.65	

Water @ 110°–115°C — 0.059 per cent

June 14, 1890 — 12.10 P.M.

Limestones Hopkins

Lab K°. 404. Red marble marked: "Note book 82, p. 76. November 29, 1889. Red marble NW. of SW. of Section 1, 16 N., 17 W. On hill east of Tomahawk near D. Thompson's Co. C. C. Hopkins". (34)

For water, loss B.B. + alk.

	wt air dry =	2.0114
	wt dry @ 110°-115°C =	2.0093
	wt C + HOH bf. ht. =	19.7836
	wt C + HOH af. ht. =	19.7815
0.10%	wt water =	0.0021
	wt C + HOH bf. ht + B.B. =	19.7815
	" af. ht + B.B. =	18.9314
42.308%	wt loss B.B. =	0.8501
Bi_2O_3 free	wt Na Cl + KCl + D =	14.1755 grams
	wt D =	14.1639 "
	wt KCl + Na Cl =	0.0116 "
K_2O = .00328 = 0.16(3)%	wt KCl =	0.0052
Na_2O = .00329 = 0.16(5)%	wt Na Cl =	0.0064
	wt K_2PtCl_6 =	0.0173
	wt KCl =	0.0052

For P_2O_5

wt air dry =	2.0010.5
wt dry @ 110°-115°C =	

wt $Mg_2P_2O_7$ = None

wt P_2O_5 =

Fe. R. req. 0.8 cc $KMnO_4$ = .0049608 Fe = .007086 Fe_2O_3
= 0.35 % Fe_2O_3.

Fe (sol.) req. 1.6 cc $KMnO_4$ = .009917 Fe = .014167 Fe_2O_3
= 0.7 % Fe_2O_3

Limestones Hopkins J.6.

Lab № 7404 For Analysis Wt air dry = 2.0004 ✓
Wt @ 110°-115° = 1.9984 N

3.038 % Wt Residue = .06072 gram.
2.437 % Wt SiO_2 R = .04872
0.536 % Wt $Fe_2O_3 + Al_2O_3$ R = .01072
0.35 Wt Fe_2O_3 R = 0.007086
0.18 % (R) Al_2O_3.
Wt CaO R = trace.
Wt $Mg_2P_2O_7$ R = Undet
Wt MgO R =

(Incorrect decimal) 0.88% Wt $Fe_2O_3 + Al_2O_3$ R = 0.01772
0.70% Wt Fe_2O_3 R = 0.01417
.18% Al_2O_3

Note: Ca mg made up to 250 cc

50 cc Wt CaO R = 0.21407 gram
50 cc Wt $Mg_2P_2O_7$ R = .00609 gram
Wt MgO R =

50 cc ear CaO = 0.21327
" Wt $Mg_2P_2O_7$ = .00419 gram.
" Wt MgO =

Mean $Mg_2P_2O_7$ = .00514 ÷ MgO = .00185 Total MgO = .00925 = 0.46%
Mean CaO = .21367, ∴ Total CaO = 1.06835 = 53.46 %

Résumé 404.

Silica	2.43	per cent
Alumina	0.36	" "
Ferric oxide	1.05	" "
Manganese oxide	trace	" "
Lime	53.46	" "
Magnesia	0.46	" "
Potash	0.16 (3)	" "
Soda	0.16 (5)	" "
Phosphoric acid	none.	" "
Loss on ignition (Carbon dioxide & org. matter)	42.30	" "
Total	100.38	" "

Water @ 110°-115° — 0.10 per cent.

June 14, 1890. 3 PM. RnB RnB
RnB Brackett RnB

Limestones Hopkins.

Teale N° 405. "Pinkish nearly white crypt. limestone marked: Notebook 82 page Dec. 21889 (12/2/89)

(94) Pink in forks of mill creek. Jos. Cole C. Hopkins "

For water, loss B.B. + dark	wt air dry =	2.00325	
	wt @ 110°-115° C =	2.0024	
	wt c + 405 bflt =	20.45935	
	" " aflt =	20.45850	
0.04%	wt water =	0.00085	
	wt c + 405 bflt + B.B. =	20.4585	
	" " aflt + B.B. =	19.5816	
43.79%	wt loss B.B. =	0.8769	
Bi_2O_3 fusion	wt O + NaCl + KCl =	14.16950	
	wt O =	14.16375	
K_2O = .00152 = .075%	wt KCl + NaCl =	0.00575	
Na_2O = .00177 = .088	wt KCl =	0.00241	
	wt NaCl =	0.00334	
	wt K_2PtCl_6 =	0.0079 gram.	
	wt KCl =		

For P$_2$O$_5$ wt air dry = 2.00024 grams.
at 0 @ 110°-115° C =

Slight trace wt $Mg_2P_2O_7$ = Slight trace
wt $BiPO_4$ =

Fe as Fe_2O_3 MnO_4 = .00186 Fe = Fe_2O_3

$\frac{Fe}{Fe_2O_3}$

Lead No 405. Analysis wt air dry = 2.0002
with HCl dilute. wt @ 110°-115°C = 1.9994

0.11 wt Residue = .0022 Gram.

(.13 Rnt SiO2 and = 0.0027
.08 Rnt Fe2O3 + Al2O3 = 0.0017)

Rnt CaO =
Rnt Mg2P2O7 = Slight trace
Rnt MgO =

0.086% wt Fe2O3 + Al2O3 = .0017 Gram
wt Fe2O3 =
Al2O3 none

50cc wt CaO = 0.2251 } Mean = .22483
50cc wt CaO = 0.2245 }

Note: Made Mg + Ca up to 250cc.

50cc wt Mg2P2O7 = Slight trace MgO } Slight trace
50cc wt Mg2P2O7 = MgO }

Total CaO = 1.1241 = 56.22%
Total MgO = Slight trace

Résumé of 405

Silica + insoluble matter	0.11	per cent.
Alumina	none	" "
Ferric oxide	0.08	" "
Lime	56.22	" "
Magnesia	slight trace	" "
Potash	0.07(5)	" "
Soda	0.08(8)	" "
Phosphoric acid	slight trace	
Loss on ignition (CO2 and water)	43.79	" "
Total	100.35	

Water @ 110°/115°C — 0.04 per cent.

No manganese

Limestones Kaplan.

Lab no. 406 Gray crystl. limestone marked: Nate Book 82, page . 12/2/89. Gray in mill Creek west of St. Joe Coll. "Kaplan".

Petroleum smell

~~For~~ water, loss B.B ~~tests~~	wt air dry =	2.0013
	wt dry @ 110°-115°C =	2.0003
	wt c + 406 bf. ht. =	19.7653
	" " af. ht. =	19.7643
0.04(9)%	wt water =	0.0010
	wt c + 406 bf ht B.B =	19.7643
	" " af ht B.B =	18.8886
43.77%	wt loss B.B =	0.8757
Bi_2O_3 fused	wt Ca + Ke + Na Cl =	15.7917
	wt Ca =	15.7843
K_2O = .00252 = .12%	wt K Cl + Na Cl =	0.0074
Na_2O = .00180 = .089	wt K Cl =	0.0040
	wt Na Cl =	0.0034
	wt K_2PtCl_6 =	.0131
	wt K Cl =	

For P_2O_5

	wt air dry =	2.0003 grams.
	wt dry @ 110°-115°C =	
Ca	wt $Mg_2P_2O_7$ = Mg	
	wt P_2O_5 =	

For Mg

	wt air dry =	2.0005 grams.
	wt dry @ 110°-115°C. =	1.9996 "

Fe req'd 0.3 cc $KMnO_4$ .0018 Fe

All Fe as FeO

Lead #406 For Analysis grain dry = 2.0003
#ce dil. #H2O @ 110°-115°C = 1.9994

0.30% #Residue = .0060 2 gram
(#SiO2 R = .00628
#Fe2O3 + Al2O3 R. =
#Fe2O3 R =)

0.06% #Fe2O3 + Al2O3 = .00122 gram.
#Fe2O3 = Al2O3 none.

50 cc. #CaO = 0.22522 } mean = .22452
50 cc. #CaO = 0.22382 }
Total CaO = 1.1226 = 56.14 per cent

Note: Made Ca+Mg up to 250 cc.

50 cc Mg2P2O7 = MgO = } slight trace.
50 cc. Mg2P2O7 = MgO = }
Total MgO =

Résumé of #406

Silica insoluble matter	0.30	per cent	
Alumina	none	"	"
Ferric oxide	0.06	"	"
Lime	56.14	"	"
Magnesia	slight trace	"	"
Potash	0.12	"	"
Soda	0.08(9)	"	"
Phosphone acid	trace	"	"
Loss on ignition	43.77	"	"
Total	100.47		
water @ 110°-115°C	0.049	per cent.	

Or Prof.

no Manganese.

Limestones. Hopkins.

Lab № 407 – Dark & light gray Crypt. limestone – equal parts mixed for analysis. marked:

"Notebook 72, page 48". August 26, 1889.
Near Big Spring south of Mt. View road in Spanish Creek. Sec. 21 (?), 3N., 7W. Cole & Hopkins"

Determine percentage of lime.

For water & lime

wt air dry = 1.0058
wt D @ 110-115°C = 1.0047

wt C + 407 bfht = 9.7920
wt C + 407 afht = 9.7909
0.10% wt water 0.0011

1.39%
.08
1.47%

wt Residue (insoluble) = .01407
= .00082

50 cc (1) wt CaO = 0.13884) mean .13799 × 4 = .55196
50 cc. (2) wt CaO = 0.13714)

(Made solution up to 200 cc.)

Percent CaO = 54.93%

Résumé of 407

Insoluble in hydrochloric acid	1.47	per cent.
Calcium carbonate	98.07	" "
Total	99.54	

R.N.B

O.C

Limestones Reports

Lab. No 408 — Gray cryst. limestone marked: "Notebook 66, page 8. July 3rd 1889. S.E. Corner of S.W. ¼ N.W. ¼ section 25, 14 N., 6 W. Jas. Jones quarry or Wauwatosa 60 ft high Composed of thin. Coll. D. Hopkins." (4)

Petroleum odor when struck

Determine of lime.

For water & lime — wt air dry = 1.0075
wt dry @ 110°-115°C. = 1.0043
wt C + 408 bfht = 9.1558
wt C + 408 afht = 9.1526
0.31% — wt water = 0.0032

4.25
.13
4.38 %

Wt Residue (insol HCl) = .04292
= .00137

50 cc. (1) wt CaO = .13504 } mean .13476
50 cc. (2) wt CaO = .13449
(Made up to 200 cc.) — very slight reaction to ammonium oxalate (reaction of Mn)

Total CaO (in 200 cc.) = .53906 = 53.67 per cent.

Résumé of 408.

Insoluble in hydrochloric acid	4.38	per cent.
Calcium Carbonate	95.82	" " = 53.67 CaO.
Total	100.20	

R.N.B. — O.C.

Limestones — Hopkins.

Lab. No. 409 — marked: "Notebook 82, page 15 10/24/89. Wt. br. of Little Rocky Bayou, n. of B & Mt. View road. The rock that accems in shaly form underneath the Bay Spring. Calcareous chert (?) Coll. C. Hopkins" (1065)

Determine lime.

For water & lime wt air dry = 1.0034
wt 3g @ 110°-115°C = 1.0033

wt c + 409 bf ht = 8.5431
wt c + 409 af ht = 8.5421
0.0010

0.09% wt water

52.46% wt Residue (insol HCl) = 0.526242 grams
.34 = 0.003343 "
52.80%

50 cc. (1) wt CaO = .06779 } mean .06733
50 cc. (2) wt CaO = .06689 }

(made up to 200 cc.) CaO total in 200 cc. = .26936
= 26.84%

Résumé of 409

Insoluble in hydrochloric acid — 52.46 per cent.
Calcium carbonate — 47.92 " "
Total 100.38 + .34 = 100.72.
water @ 110°-115°C. 0.09 per cent.

RNB

OC.

Lead No. 410 – Red Coarse Crystl. free of fossils.
marked: "Notebook 82 12/2/89 St. Joe
Eocrinital red marble. Coll. T.C. Hopkins." (406)
Determine percentage of lime. –
& Are fossils aragonite or calcite?

For water & lime at air dry = 1.00475
wt of @ 110°-115°C. = 1.0038
wt C + 410 Bght = 0.3333
wt C + 410 dght = 0.3326
0.069% at water 0.0007

1.16% of Residue (insol HCl) = .01170

50 cc. wt CaO = 0.14119 } Mean
50 cc wt CaO = 0.13879 }
(Made up to 200 cc) Total CaO = .55516 = 55.30 %
= per cent.

Résumé of 410.

Insoluble in hydrochloric acid	1.16	per cent.
Calcium Carbonate	98.73	" "
Total	99.89	per cent.
water @ 110°-115°C. –		per cent.

RnB

OK

Limestones Hopkins.

Table 412 (a). Marked: "Notebook 82 page 23, 10/28/89. N.E. 21, 15 " 11. S. Sgl. across creek from Proctor's house found above the m^bl and underneath the S.S. The amorphous spec. in contact with the Ls. Like semi cryst. spec. 10 ft below it. Coll. J.C. Hopkins (3rd)

For lime.

For water klinie. wt air dry = 1.0000 grams.
wt dry @ 110°-115°C = 0.9991 "
wt C + 412 a. after = 9.1489
" " after = 9.1476
0.129% wt water = 0.0013

7.89% Wt residue = 0.07892 gram

Made up to 200 cc.
50 cc. wt CaO = 0.12482 grams. } mean = .124905
50 cc. wt CaO = 0.12499 " }
Total CaO (in 200 cc.) = .499620 = 50.00% CaO

Résumé of 412 (a)

Insoluble in hydrochloric acid (dil)	7.89	per cent.
Calcium Carbonate	89.27	"
Total	97.16	"
water @ 110°-115°C.	0.129%	"

Undetermined in solution 100 - 97.16 = 2.84%

A C R [illegible] B

Limestone Hopkins

Lab # 412 (b) see app page. (34) (Coarser crystalline)

In water of lime wt air dry = 1.0003 grams.
" " @ 110°-115°C = 0.9992

	wt C + 412b. after ht. =	8.3291	grams.
	" " after ht =	8.3280	"
0.109%	wt water =	0.0011	"

2.50% wt Residue = 0.025002 gram.

Made up to 200 cc.

50 cc wt CaO = .13299 } mean .13234
50 cc wt CaO = .13169 }
2) .26468

Total CaO = .52936 = 52.97%

Résumé of 412(b)

Insoluble in hydrochloric acid (dc)	2.50	Percent
Calcium Carbonate	94.57	"
Total	97.07	"
water @ 110°-115°C.	0.109	"

undetermined in solution 2.93%

O.K. R.B.
May 28/890

Limestones &c. F. C. Hopkins

Lab No. 413. marked: "Notebook 82, page 83. 12, 2. 1889
Sec. 28, 17 N., 17 W. Head of Tomahawk, Montana
County. Coll. F. C. Hopkins." (61)
Red vein?
Gangue — test for Mn & Fe.

Gangue gave faint reaction for manganese

Almost entirely soluble in HCl with strong effervescence. Solution not yellow. No reaction for iron with ferrocyanide of K.

OK. R. B. Oct 3/89

Red vein. Hematite

OK R. B. / Oct 3, 1889

Limestones &c Sandpits

Lab No 414 (a) Coarse marked: "Tip Top" lower point of Painters Bluff. Coll J.C.K. (23)

— Qual. anal. + per cent. of lime —

For water + lime — wt air dry = 1.0022 grams
wt dry @ 110°-115°C = 1.0010 "

0.11% wt water = .0012
2.46% wt Residue = 0.02472

Made up to 200 cc.

50 cc wt (lime) CaO = .13339
50 cc wt " " CaO = .13539
Mean = .13439 Total CaO = .53756 = 53.70 % CaO

Wt for Qual. Anal = @ 1. gram

Found: Besides calcium found a little (iron + aluminia) precip. by ammonia — Considerable magnesia — no reaction — alumina — no reaction — alkalies — K + Na — a little silica + clay matter. Decided no reaction

Résumé. 414 (a)

Insoluble in (dil) hydrochloric acid	2 46	per cent
Calcium Carbonate	95 88	" "
Total	98 34	
water @ 110°-115°C	0.119	per cent

Undetermined residue 1.66%

O.K. R.

414 (b) Fine label same as above. (23)

— Qual. anal. + per cent. of lime —

For water + lime — wt air dry = 1.0009 grams.
wt dry @ 110°-115°C = 0.9995 "

0.13% wt water = 0.0014 gram
3.77 wt Residue = 0.03772

Made up to 200 c.c.

50 c.c. wt CaO = .13329
50 c.c. wt CaO = .13139
Mean = .13234 Total CaO = .52936 = 52.96%

Wt for qual. anal. = @ 1. gram.

Found: besides ammonia precip. Calcium + aluminia a little (iron + aluminia) seems to be a trifle more than in 414 (a). a little magnesia more than in 414 (a). alumina — no reaction. alkalies — K + Na a little silica + clay matter. No reaction worth noting as in 414 (a)

Résumé 414 (b)

Insol. in dil HCl	3.77	per cent
Calcium Carbonate	94 46	" "
Total	98.93	
water @ 110°-115°C	0.13	per cent

O.K. R.R. July 8/84.

J. C. Hopkins, Limestones

Lab No 31. Light gray limestone. Label: "Note book 107, p. 70, 7/15/90. Section 36, 18(N) 13(W). Collector J.C. Hopkins 5/(22) — Magnesian limestone? —

Air dried = 1.0000 gram.

13.52% = Wt SiO_2 + Insolubles in Conc. HCl = .13522.3

0.89% = Wt $Fe_2O_3 + Al_2O_3$ = .00892

Filtrate made up to 250 c.c. — of

50 cc = Wt CaO = .05603 { Wt $Mg_2P_2O_7$ = .10142 grms. Wt MgO =

50 cc (2) Wt CaO = .05403 { Wt $Mg_2P_2O_7$ = .10492 (mist) Wt MgO = .20634

2) .11006

Mean .05503

(2) .10317

.05503 × 2.5

(27515 / 11006)

.13 7875 .27515

Resumé of Partial Analysis:-

Air dried specimen gave:

(SiO_2)	Silica + insolubles in conc HCl =	13.52	per cent
	Ferric oxide (chiefly ferric oxide) + Alumina =	0.89	" "
	Lime (CaO)	27.01	" "
	Magnesia (MgO)	18.27	
	Total		

Hence Carbonate of lime ($CaCO_3$) = 49.14 per cent

Carbonate of magnesia ($MgCO_3$) =

$CaCO_3$ = ~~49.14~~ 48.23

$MgCO_3$ = ~~39.04~~ 38.36

Feb. 11 '91

Lab. no. B2 — Gray limestone. Label: "Notebook 102, p. 15
3/8/90. Near mouth of Caney Creek 3 miles east
of Mt Hersey. Collector H. Hopkins (110)."
Magnesian Limestone?
wt air dried = 1.0000 gram.

wt SiO_2 + insolubles in Conc. HCl = lost.
wt $Fe_2O_3 + Al_2O_3$ = .01212 1.21%
Filtrate made up to 250 c.c.

$CaCO_3$ = 50 c.c. = wt CaO = 0.06373
wt $Mg_2P_2O_7$ = .09392
wt MgO = %
% $MgCO_3$ =

Facet 2, wt CaO = 0.06303
2) .12676
.06338
31.69 % CaO .31690

wt $Mg_2P_2O_7$ = .08942
wt MgO =
% $MgCO_3$
Mean .09167

Resume

Air dried specimen gave:

Silica + insol. in HCl (conc)		per cent.
Ferric oxide, alumina (mostly Fe oxide)	1.21	
Lime (CaO)	31.69	" "
Magnesia (MgO)	16.52	
$CaCO_3$	56.58	per cent.
$MgCO_3$	34.69	" "

For SiO_2 + insol.
wt air dried = 1.0000 gram
wt SiO_2 + insol. = .08012
= 8.01 %

Penrose — Limestones
Red limestones

Small piece — highly magnesian —
Locality: Loch Lomond Cape Breton.

Large piece — contains comparatively little magnesia
Locality: Markhamville New Brunswick.

R.n.B. April 14, 1891.

Penrose
Limonite (so called) — Canadian and Arkansas
water dag loss B.B.

CANADIAN from crystalline fibrous Locality. Pictou County, Nova Scotia.

	wt C + limonite bf.ht. =	21.6099 grams.
	" + " af.ht. =	21.6049 "
0.319 o/o	water @ 100–115°C. =	0.0050 "
	wt C + limonite bf.ht. B.B. =	21.6049 "
	" + " af.ht. B.B. =	21.4035 "
12.91 o/o	wt loss B.B. =	0.2014 "

wt air dried = 1.5648 grams. ∴ dried at 110°C = 1.5598

Limonite

ARKANSAS fr. cryst. botryoidal — Locality:— Montgomery County

	wt C + lim. bf.ht. =	20.5559
	" + " af.ht. =	20.5042
1.81 o/o	wt water @ 100–115°C =	0.0517
	wt C + lim. bf.ht. B.B. =	20.5042
	" + " af.ht. B.B. =	20.3543
5.36 o/o	wt loss B.B. =	0.1499

wt air dried = 2.8482
wt D @ 100–115°C = 2.7965

Turgite

3

The Canadian ore approximates most nearly to a limonite — $2Fe_2O_3 . 3H_2O$.
The Arkansas ore approaches more nearly to Turgite. $2Fe_2O_3 . H_2O$.

R.n.B. April 15/91.

Rocks

Lab № 411. Augite Little Rock Locality J. Francis Williams

For water, loss B3 ~~salt~~.

wt air dry = 1.0087
wt dry @ 110°-115°C = 1.0071

wt C + 411 bf ht = 19.4884
" + " aft ht. = 19.4868
0.0016

0.15% wt water =

wt C + 411 bf ht B3 = 19.4868
" + " aft ht B3 = 19.4757 (Tared very much)
1.10% wt loss B3 = 0.0111

Bi_2O_3 fusion
wt air dry = 1.00965
" dry @ 110°-111°C = 1.00814

wt D + NaCl + KCl = 15.83352
wt D = 15.78345
wt KCl + NaCl = 0.05007
wt KCl = 0.01555
wt NaCl = 0.03452
wt K_2PtCl_6 = 0.05409 gram
wt K = 0.01555

K_2O = .00979 = 0.97%
Na_2O = .01867 = 1.85

For P_2O_5

wt air dry = 2.0017 grams.
wt dry @ 110°-111°C = 1.9987

wt $Mg_2P_2O_7$ = 0.01812 grams
0.57% wt P_2O_5 = 0.011590

For FeO.

(1) wt air dry = 0.50135 gram.
wt dry @ 110°-115°C. =
(2) wt air dry = 0.5011 gram
wt dry @ 110°-115°C. =

411 - with HCl

wt air dry = 1.00005 gram.
wt dry @ 110°-115°C =

wt Residue =
wt SiO_2 R. =

Manipulation becomes longer.

See page 106.

H 11. Augitite — For analysis wt air dry = 1.0193 grams.
wt d) @ 110°-115°C = 1.0178.

K_2CO_3 / Na_2CO_3 } fusion —
45.44% wt SiO_2 = 0.462552 gram.

(faint blue reaction) 28.87 wt $Fe_2O_3 + Al_2O_3$ = 0.2939 gram.
wt Fe_2O_3 =

14.31% wt CaO = 0.145669 gram
wt $Mg_2P_2O_7$ = 0.025559 "
0.90% wt MgO = 0.009222

II Portion for Sulphur wt air dry = 1.0023 grams.
wt d) @ 110°-115°C = 1.0008 "

See page 107

For Sulphur wt air dry =
wt d) @ 110°-115°C =

Résumé H 11 Augitite.

Silica	45 44	per cent	
Alumina		"	"
Ferric oxide	28.87	"	"
Ferrous oxide		"	"
Lime	14 31	"	"
Magnesia	0 90	"	"
Potash	0 97	"	"
Soda	1.85	"	"
Phosphoric acid	0 57	"	"
Loss on ignition	1.10	"	"
Total	93 01	"	"
water @ 110°-115°C.	0.15	per cent.	

Lab No. 321, Red clay marked: "Notebook 2, page 61 July 13 1898. Brooks Mine - Shaft 1
SW¼ SE¼ Sec. 10 — 14 N., 7 W. Cal. R. & P. Meridian (18)
— Complete Analysis —

For water loss B.B. [redacted].

wt air dry = 1.0040
wt @ 110°-115°C = .9606

wt C + 321 after ht. = 9.1024
" " after ht. = 9.1090
wt water = 0.0434 — 4.32%

wt C + 321 after ht + B.B. = 9.1090
wt C + 321 after ht + B.B. = 9.0386
wt loss B.B. = 0.0704 — 7.32%

For alkalies Bi₂O₃ fusion

wt air dry = 2.0016
wt @ 110°-115°C = 1.9152
wt D + NaCl + KCl = 14.2009
wt D = 14.1629
wt KCl + NaCl = 0.0370
wt KCl = 0.0240
wt NaCl = 0.0130
K₂O = .01516 = 0.79%
Na₂O = .00689 = 0.35%
wt K_2PtCl_6 = 0.0787 grams.
wt KCl = 0.0240

For P_2O_5

wt air dry = 2.0025 grams
wt @ 110°-115°C = 1.9160 "
wt $Mg_2P_2O_7$ = .00959
wt P_2O_5 = .00613 — 0.31%

Fe req 9.2 cc $KMnO_4$ = .05704 Fe = .08149 Fe_2O_3
= 8.4% of Fe_2O_3.

Lab No 321 — Trianalysis wt air dry = 1.0108
K_2CO_3 & Na_2CO_3 fusion (Mn reactⁿ rather strong) wt @ 110°–115°C = 0.9672

62.93(5)% wt SiO_2 = 0.608867 Gram (= 62.77%)

26.18% wt $Fe_2O_3 + Al_2O_3$ = 0.253222
8.42 Fe_2O_3 = 0.081490
17.76 Al_2O_3 =

0.55% wt CaO = .005382

wt $Mg_2P_2O_7$ = .00707
0.26% wt MgO = .00254 with trace of Mn

1.34% wt Na_2O_4 = 0.1302

Résumé of 321

Silica	62.93	per cent
Alumina	17.76	" "
Ferric oxide	8.42	" "
Manganese oxide	1.34	" "
Lime	0.55	" "
Magnesia	0.26	" "
Potash	0.79	" "
Soda	0.35	" "
Phosphoric acid	0.31	" "
Loss on ignition	7.32	" "
Total	100.03	per Cent
water @ 110°–115°C	4.32	per cent

O.K. P.M.

June 14, 1890. 4.10 P.M.

Kaolin 320. Manganese bearing sand, marked: "Notebook 72, page 45 July 13, 1889. Gruba property S.E. N.E. 4, 14, 7, Cullman Co. Ala."

— Complete analysis —

For water loss B.B. — wt air dry = 1.0002 ✓

wt dry @ 110°-115°C = .9951 ✓

	wt C + 320 bfht =	9.1487
	" " afht =	9.1436
0.509%	wt water =	0.0051
	wt C + 320 bfht B.B. =	9.14360
	wt C + 320 afht B.B. =	9.12185
2.18%	wt loss B.B. =	0.02175

For alkalies — wt air dry = 2.00193

wt dry @ 110°-115°C = 1.99177

wt KCl + NaCl + KCl = 15.8089

wt H₂O = 15.7845

wt NaCl + KCl = 0.0244

wt KCl = 0.0154

wt NaCl = 0.0090

K₂O = .0097 = 0.97%

Na₂O = .0047 = 0.47%

wt K₂PtCl₆ = 0.0507

wt KCl = 0.0154

For P_2O_5 — wt air dry = 2.0013

wt dry @ 110°-115°C =

No Reaction

wt $Mg_2P_2O_7$ = None

wt P_2O_5 =

Fe req'd 8.8 cc KMnO₄ = .05456 Fe = .07795 Fe_2O_3

= 7.81% of Fe_2O_3.

0.14

Lead 20 — For analysis — wt air dry = 1.0028 ✓
Mn reacts very strong with K_2CO_3 or Na_2CO_3 fusion — wt @ 110°-115°C = .9977 ✓

wt SiO_2 = 0.83397 grams. 83.58%

11.27(7)% wt $Fe_2O_3 + Al_2O_3$ = .11252
7.81 / 3.46 Al_2O_3 — Fe_2O_3 = .07795

0.41% wt CaO = .00412 grams.
wt $Mg_2P_2O_7$ = 0.01347 "
0.48% wt MgO = 0.00485 " (with trace of Mn)

1.37% wt Mn_3O_4 = .01372 00

Résumé of 20

Silica	83.58	per cent
Alumina	3.46	" "
Ferric oxide	7.81	" "
Manganese oxide	1.37	" "
Lime	0.41	" "
Magnesia	0.48	" "
Potash	0.97	" "
Soda	0.47	" "
Phosphoric acid	none	" "
Loss on ignition	2.18	" "
Total	100.73	" "
water @ 110°-115°C	0.509	percent.

OK
Rn 13

Rocks

411 Continued – with HCl. Qualitative – almost all decomposed by HCl concentrated

No precipitate with H_2S. –

Residue after decomposition with HCl Calc. silica & black grains – under microscope –

Limestone – Hopkins

Lab No. 36. Dark brownish crystalline limestone – when struck (especially when powdered) gives odor of petroleum – Label: Notebook 2 – page 19. July 26, 1889. Lafferty Creek. Sec 3, 18N., 8W. Hopkins.

Partial analysis air dried darker portion.

Silica & insoluble in strong HCl	—	0.34 per cent
Ferric oxide & alumina	—	0.07 " "
Lime (CaO)	—	55.26 " "
Magnesia (MgO)	—	1.01 " "
Total		56.68 " "
∴ Carbonate of lime ($CaCO_3$)	—	98.67 %,
Carbonate of magnesia ($MgCO_3$)	—	2.14 %

Rec'd Feb 24/891

Taken for analysis – air dried 1. gram.

wt insol. silica (in conc HCl) = .00342 = 0.34 %

Filtrate made up to 250 cc

50 cc. (1) wt CaO = 0.11183 — wt $Mg_2P_2O_7$ = .00562

50 cc. (2) wt CaO = 0.11053 — wt $Mg_2P_2O_7$ = .00692

(1) MgO = .00203

MgO & $Mg_2P_2O_7$

(2) MgO =

wt Fe_2O_3 + Al_2O_3 = .00072

Total CaO (1) — 0.55915 grams. — 55.92 % (CaO) lime

" (2) 0.55265 " — 55.26

If take (1) – $CaCO_3$ = 98.67 per cent

mean (1) & (2) $CaCO_3$ = 99.26 "

mean of $Mg_2P_2O_7$ (1) & (2) = .00627 50 cc. : 100 cc. = 2.03135 grm.

MgO = .011297 grm 1.13 %

4 11 Continued fusion (K_2CO_3 & Na_2CO_3) — wt air dry = 1.0023; wt @ 100°+115° = 1.0008

Nate with H_2S no precipitate except sulphur.

44.98% — wt SiO_2 = .45022

wt CaO = .14029 = 14.01 %

Manganese ores – Pulaski County.

Lab N° 34 Compact

Ironanalysis (Mn, SiO_2) – Partial – wt air dried = 1.0008 grms.

wt SiO_2 insols = 0.29332 – Filtrate made up to 250 cc.

50 cc (1) $Mn_2P_2O_7$ 0.20902 ∴ total = 1.04510 ∴ Mn = .4043 — Mn = 40.39; P = 0.0026; SiO_2 insols. = 29.30%

50 cc (2)

For P_2O_5 – wt air dried = 2.0005

wt $Mg_2P_2O_7$ = .01912 grams ∴ P = .00534

50 cc req'd — .7 cc KMnO4 ∴ wt Fe = .00434 ∴ total Fe = .02170 — Fe = 2.17%

R.N.B Feb 24th 1891

Lab N° 35 — Porous.

Ironanalysis (Mn, SiO_2) partial. — wt air dried — 1.0002 grams.

wt SiO_2 insols. = 0.04832 — Filtrate made up to 250 cc.

50 cc (1) $Mn_2P_2O_7$ .30862 grms. ∴ Total $Mn_2P_2O_7$ = .25431 ∴ Mn = .5970 — Mn = 59.68 a/o; P = 0.0011; SiO_2 insols. = 4.83 a/o; Fe = 3.09

50 cc (2)

For P_2O_5 — wt air dried — 2.000

wt $Mg_2P_2O_7$ = .00822 ∴ P = .00297

50 cc req'd cc KMnO4

R.N.B Feb 20 1891

Penrose Mn
Preakness.
3s Talk°. Av. oxygen.

I wt air dried 0.20115 gram

$$CO_2 = \begin{cases} .1467 \\ .0108 \\ \hline .1575 \end{cases}$$

$$Av.\ O = \frac{.1575 \times 15.96}{87.78} = Av.O = .02863 = 14.23\%$$

II wt air dried = .2051 gram.

$$CO_2 = \begin{cases} .1483 \\ .0101 \\ \hline .1584 \end{cases}$$

$$Av.O\ \frac{.1584 \times 15.96}{87.78} = Av.O = .02879 = 14.03\%$$

Mean $\frac{2)\ 28.26}{14.13}$

Rn B May 4 '91

Penrose Minerals.

Tephroite, Mason Co — Texas analyzed by Noyes

Ca.) sp.gr.

wt air dried = 2.0329

(1) wt ft + T imd = 1.7057 grams
wt p " = 0.1882 grams
wt T imd = 1.5175 grams.

2.0329
1.5175
0.5154 Lossnt in water

$\frac{2.0329}{.5154} = 3.94$ sp gr.

*(2) wt ft + T imd =
wt p imd = 0.1882
wt T imd = ____

wt ft dried =
" air dried = ____
Absorption = ____

* Stood 24 hrs. in water

Lab. No. 417. White powder with few lumps marked: "Polishing powder. S.E. ¼ S.W. ¼ section 12, 4 S., 26 W. Col. U.S. Griswold."

Sample freed from few flakes of brown clay found through it & passed thro' 150 mesh to inch. A large part passed thro' or could be made to by rubbing gently with the finger, without any pondering being necessary. — Pure white.

For water, Ger. B.B. talk — wt air dry = 2.0074
wt dry @ 110°–115°C. = 2.0068

wt C + 417 after ht = 19.7695
wt C + 417 after ht = 19.7669
0.029% wt water = 0.0006

wt C + 417 before ht B.B. = 19.7669
wt C + 417 after ht B.B. = 19.7541
0.63% wt loss on ignition = 0.0128

(note: no change on 2nd heating)

Bi_2O_3 fusion

wt dry + NaCl + KCl = 15.7933
wt dry = 15.7845
wt KCl + NaCl = 0.0088
K_2O = .00265 = .13% wt KCl = 0.0042
Na_2O = .00244 .12% wt NaCl = 0.0046
wt H_2PtCl_6 = 0.0140
wt KCl =

For analysis — wt air dry = 1.0055
(K_2Cl_2 Na_2O_3 fusion) wt dry @ 110–115°C. = 1.0052
98.58% wt SiO_2 = .99102

1.27% (1) wt $Fe_2O_3 + Al_2O_3$ = .01282
.35% wt Fe_2O_3 = .00354
.92%

wt CaO = trace
wt $Mg_2P_2O_7$ = slight trace
wt MgO =

Lab № 417 (Continued) — Redetermination Silica

wt air dry = 0.5048 gram.
wt H₂O @ 110°-115°C = 0.0047
97.32% wt SiO_2 after heating to constant wt = .49122

In first determination silica wt heated to constant wt.

2.06% / 1.96% wt $Fe_2O_3 + Al_2O_3$ = .01042
= .00992
FeO_3 = .00354

98.58
97.32
2) 195.90
97.95% Mean of two silica determinations.

Mean of $Fe_2O_3 + Al_2O_3$ = 1.27
1.96
2) 3.23
1.61 %

Fe_2O_3 from (1) = 0.35 %
~~Fe_2O_3 from (2) =~~
Mean =

Résumé of 417:

	(2)	(1)		Mean of 1 & 2
Silica	97.32	98.58	per cent	97.95
Alumina	1.61	1.27		1.61
Ferric oxide	.35			
Lime	tr	trace	" "	tr
Magnesia	Sl tr	slight trace	" "	Sl tr.
Potash	.13	0.13	" "	.13
Soda	.12	0.12	" "	.12
Loss on ignition	.63	0.63	" "	.63
Total	100.16	100.73		100.44
Water @ 110°-115°C		0.029 %		

Lab No 418 Tripoli – O – Cut from end of roller with lathe" – marked: "Tripoli Seneca Mo

L.S. Grooved Collector.

Cream colored – Chips broken off – when washed a little a large quantity of it passed thru sieve of 150 meshes to inch.

For water, ash, & loss B.B. wt air dry = 2.0074
wt d @ 110°-115°C. = 2.0000+

wt C+418 aft ht. = 22.1056
wt C+418 aft ht. = 22.1013
0.21% wt water = 0.0043

wt C+418 aft ht B.B. = 22.1013
wt C+418 aft ht B.B. = 22.0912
0.502% wt Loss B.B. = 0.0101

Note: Ground little too fine during Na_2O det.

Bi_2O_3 fusn wt D + NaCl + KCl = 14.1792
wt D = 14.1636
wt KCl + NaCl = 0.0156
K_2O = .00341 = 0.17% wt KCl = 0.0054
Na_2O = .00541 = 0.27% wt NaCl = 0.0102
wt K_2PtCl_6 = 0.0177
wt KCl = 0.0054

For analysis wt air dry = 1.0071
(K_2CO_3 Na_2CO_3 fusn) wt d @ 110°-115° C. = 1.0050

99.09% wt SiO_2 = .99592*
0.5% (1) wt Fe_2O_3 + Al_2O_3 = .00602
.39 wt Fe_2O_3 = .00398
.20

wt CaO = very slight trace
wt $Mg_2P_2O_7$ = Extremely slight trace.
wt MgO =

98.99 * after heating to constant wt = .99492

Lab No 418 (continued) —
Redetermn. alkalies in 418.

Redetermination of Silica in 418
wt taken dry = 0.5013
wt ♀ @ 110°-115°C = 0.5003
98.28 % wt SiO_2 after heating to a constant wt. = .49172

98.28
98.99
197.27
98.63 % mean of two determinations

Fe_2O_3 = .00265 .53%
.70% (2) Al_2O_3 $CaCl_2$ = .00352
mean (1) .59 (2) .70 = .64%

Résumé of 418.

Silica	98.28	98.99	per cent		98.63 (mean 172)
Alumina	0.17	59			.64
Ferric oxide	.53				
Lime	very slight trace		"	"	V.S.Tr
Magnesia	Extremely slight trace		"	"	E.S.Tr
Potash	.17	0 17	"	"	.17
Soda	.27	0 27	"	"	.27
Loss on ignition	.54	0 50	"	"	.50
Total	99.92	100 52			100.21

Water @ 110°-115°C = 0.21 per cent.

Lab # 419 – Chert & Zinc ore – JCB –
Mar 1865: Zinc Mines Galena Kansas
Col J C Brunner

Treated with dil. HCl – apparently no action except sol. of a little zinc when aid stronger no other action. Piece used white inside dark outside – thru HCl rotten H_2SO_4 – ate holes in Darker & H_2SO_4 turned the white a darker color.

For determination of water in white & dark varieties.

419 W – main rock: at air dry Chips = .83575
" " @ 110°-115° C = .82795

at 419 W + C bfht = 8.98445
at 419 W + C afht = 8.97820
0.74% at water = 0.00625

Loss at red heat 5 Mins. = .0024 = .28%
Total loss @ red heat = .0089 = 1.03 %.

419 D crevice at air dry chips = 0.2408
" " @ 110°-115°C = 0.2400

at 419 D + C bfht = 9.0270
at 419 D + C afht = 9.0267
0.12% at water = 0.0003

at 419 D + C bfht red heat 5 mins = 9.0267
0.125% " afht " " = 9.0264
0.0003

Total loss nigrites at red heat = .0026 = 0.25%

June 17, 1890 3.15 P.M.

Experiments with Plumbago (Graphite).

I To test qualitative value of test with nitric & sulphuric acids

II To test value of method for quantitative determination of Graphite, with KOH &c.
Mackintosh J.B. "The determination of Graphite in Minerals." Sch. of Mins. Quarterly vol. VI. No 2. p. 159. (Jan. 1885)

I (1) Graphite (Bradfield & Balliag – cost 15¢ per pound) wt air dry @ 1 gram (1.0000g)
Treated with 1 part (5cc) HNO_3 Conc. & 4 parts (20cc) H_2SO_4 Conc. heated on sand bath – no purple color – added more $KClO_3$ & heated again – no purples. Heating lasted several hours in each case. Flask (flame) shaken at times. A little $KClO_3$ added and flask heated on waterbath – bath no purple color.

II (1) G. as in I (1) – wt air dry =
Mackintosh Method. wt Graphite found =

Penrose — Spec. gravity.

Lab no. 503 Sp. Gr.

wt air dried = 2.2603

wt. dried after immersion = 2.2650 grms.
" air dried ——— = 2.2603 "
Absorption ——— = 0.0047 "

wt. wire(pt) + ore ind = 1.9492 grams.
wt wire Pt ind = 0.1885 "
wt ore ind ——— = 1.7607 "

wt ind ore = 1.7607 grams
Absorption = 0.0047 "
wt ind ore — absorption = 1.7560

wt air dried ore = 2.2603 grams
wt ind ore — Absorption = 1.7560 "
Loss of wt in water = 0.5043 "

.5043) 2.2603 (4.488 Sp gr.
2017.2
2431.0
2017.2
4138.0
4034.4

April 15 '91

Lab No 420 Water & loss at red heat in specimens - marked:

" Zinc. Joplin Mo Coll J C Branner. May 1889"

Two portions light representing main body of rock, darker material filling crevice.

420 Light. wt air dry chips = 0.5795
wt @ 110°-115°C. chips = 0.5773

wt C + 420 bfht = 8.5268
wt C + 420 afht = 8.5246
0.37% wt water = 0.0022

0.39% wt loss @ Red heat = .0015
" total loss @ Red heat = 0.96 per cent.

420 Dark. wt air dry chips = .1996
wt @ 110°-115° C. = .1993

wt C + 420 bfht. = 8.9845
" + " afht. = 8.9842
0.15% wt water = .0003

wt loss @ red heat = .0003
0.15 Total loss @ red heat = 0.30 per cent.

Orc
Rpt
June 19/890

Lab N° 422 Pa Kaolin marked "Washed No 1
Brandywine Summit Pa Collector National Kaolin Co."

For water, lose B.B. back. wt air dry = 2.0021
wt d @ 110°-115°C = 1.9723

wt C + 422 bf ht = 20.4518
wt C + 422 af ht = 20.4220
1.48% wt water = 0.0298

wt C + 422 bf ht B.B. = 20.4220
13.62(8)% wt C + 422 af ht B.B. = 20.1532
wt lose B.B. = 0.2688

Bi_2O_3 fusn. wt D + KCl + NaCl = 15.7958
wt D = 13.7840

wt KCl + NaCl = 0.0118
K_2O = .00435 = 0.22% wt KCl = 0.0069
Na_2O = .00259 = 0.13% wt NaCl = 0.0049
wt K_2PtCl_6 = 0.0228
wt KCl =

For analysis wt air dry = 1.0371
(Decimal Mn reaction) wt d @ 110°-115°C = 1.0218
47.24% wt SiO_2 = 0.48277

* 39.21 % wt $Fe_2O_3 + Al_2O_3$ = .40069
wt Fe_2O_3 =

too high. wt CaO = .0039 = .52%
wt $Mg_2P_2O_7$ = Trace.
wt MgO =

Note large part of specimen sent taken & carefully sampled by quartering, & cutting down until sample small enough for use obtained (B.M.B.)
On ignition turns slightly pink.
* $Fe_2O_3 + Al_2O_3$ after reprn, solution reprecipitated & =

Lab no 422 - Kaolin Washed no 1

For Fe wt air dry = 0.5034
wt dry @ 110°–115°C = 0.4960

Req'd 2 cc. KMnO4
Fe_2O_3 = .01771 = 3.57%

39.21
3.57
35.64

422 for Fe wt air dry = .5098
" d @ 110°–115°C = .5017

Eq'd. KMnO4 1.1 = " wt Fe_2O_3 = .009744 1.94%
39.21
37.27

Resumé of 422.

Silica	47.24	per cent.
Alumina	37.27	" "
Ferric oxide	1.94	" "
Lime	0.5½ (trace)	"
Magnesia	trace	" "
Potash	0.22	" "
Soda	0.13	" "
Manganese		
Loss on Ignition	13.62	" "
	100.94	

water @ 110°–115°C 1.48 per cent.

Test of KMnO4 ss. wt Fe used = .1028 gm
" found = .10259 "
Req'd 16.7 cc KMnO4 = .1035 Fe

Lab N° 423 Kaolin P.A. marked: "Washed no 2 Brandywine Summit Pa Collector. National Kaolin Co."

For water, loss B.B. & Alk

wt air dry	=	2.0002
wt @ 110°-115°C	=	1.9690
wt c+423 before ht.	=	19.7380
1.55% wt c+423 after ht.	=	19.7268
wt water	=	0.0312
wt c+423 before ht B.B.	=	19.7268
wt c+423 after ht B.B.	=	19.4609
13.50% wt loss B.B.	=	0.2659

Bi_2O_3 fusion

wt D + NaCl + KCl	=	14.1794
wt D	=	14.1635
wt KCl + NaCl	=	0.0159
wt KCl	=	0.0116
wt NaCl	=	0.0043
wt K_2PtCl_6	=	.0380
wt K Cl	=	

K_2O = .00732 = 0.37%
Na_2O = .00228 = 0.11%

For analysis

wt air dry	=	1.0045
wt D @ 110°-115°C	=	.9890
wt SiO_2	=	0.48032 = 48.56%

Decided Mineral - but not so strong as 422

39.63% * wt $Fe_2O_3 + Al_2O_3$ = .39199
wt Fe_2O_3 =

Too high wt CaO = .00479 = .46%

wt MgP_2O_7 = Trace
wt MgO =

Notes: sampled as in 422. Tinted more pink than 422 on ignition.

* $Fe_2O_3 + Al_2O_3$ after repeated solution & precipitation =

Lab No 423 – Pa Kadla Washed No 2.

Redetermination of ~~Fe~~ Fe.

wt air dry = 0.50441

wt @ 100°-115°C. = 0.4963

wt $Al_2O_3 + Fe_2O_3$ = .02303 = 4.64%

For Fe & Al wt air dry = .5028

wt @ 110°-115°C = .4951

wt SiO_2 = .23152 = 46.76%

39.89% wt Fe_2O_3 & Al_2O_3 = .1975

1.78

38.11

Fe_2O_3 =

39.63

1.78

37.85

Resume' of 428.

Silica	46.76	46.76	48.56	per cent.
Alumina	37.85	34.99		
Ferric oxide	1.78	4.64	4.64	" "
Lime	.46	.46	0.46 (too high ?)	
Magnesia	trace	trace	trace	
Potash	.37	.37	.037	" "
Soda	.11	.11	0.11	" "
Loss on ignition	13.50	13.50	13.50	" "
	100.83	(0.83)	10.263	

water @ 110°-115°C = 1.55 per cent.

(eq. 1 cc $KMnO_4$ = .006201 Fe

= .00885 Fe_2O_3 = 1.78%

Lab # 4424. Pd Kaolin marked: "Crude No 1. Braudjaine Summit Pa National Kaolin Co."

For water, loss B.B., & alk. — wt air dry = 2.0048
wt @ 110°-115°C = 1.9852

wt alk + 424 bf ht. = 20.4549
wt c + 424 af ht. = 20.4353
0.97(7)% wt water = 0.0196

wt alk + 424 bf ht. B.B. = 20.4353
wt c + 424 af ht. B.B. = 20.2541
9.12(7)% wt loss B.B. = 0.1812 {Burned white.

Bi_2O_3 fusion — wt R + NaCl + KCl = 15.8056
wt R = 15.7839
wt KCl + NaCl = 0.0217
K_2O = .00846 = 0.42% — wt KCl = 0.0134
Na_2O = .00440 = 0.22 — wt NaCl = 0.0083
wt K_2PtCl_6 = 0.0440
wt KCl =

For an alpis (not strong but decided) Manganese reaction — wt air dry = 1.0009
wt @ 110°-115°C = .9912
62.75% wt SiO_2 = .62552

*27.44% wt $Fe_2O_3 + Al_2O_3$ = 0.27199
wt Fe_2O_3 =

Too high?! wt CaO = .0039 = .40%

wt MgP_2O_7 = trace
wt MgO =

{ Note: Sample from whole specimen dense white kaolin, mica or kaolinite seams sometimes present & quartz grains (angular) in the kaolin.

* wt $Fe_2O_3 + Al_2O_3$ after repeat, resolution reprecipt =

Lab. No. 424. Crude No 1 Pa Kaolin

For Fe — wt air dry = .5010
wt H_2O @ 110°-115°C = .4962

wt Fe_2O_3 = .01063 = 2.140%

27.44
2.14
25.30

Sand thro sieves 20. 40. 60. 80. 100. 150

	grms	per cent	
stopped on 20	1.21	17.60	
" " 40	1.23	17.89	Total 6.874
" " 60	1.26	18.33	
" " 80	.75	10.91	
" " 100	1.154	16.79	(92.28)
" " 150	0.74	10.77	
went thro all	0.53	7.71	

100.00

Resume of 424.

Silica	62.75	per cent.
Alumina	25.30	" "
Ferric oxide	2.14	" "
Lime	0.40	" "
Magnesia	trace	" "
Potash	0.42	" "
Soda	0.22	" "
Loss on ignition	9.12	" "
Total	100.35	

Water @ 110°-115°C = .9770%

water @ 110°-115°C =
wt air dry sand in 25 grams air dry Kaolin
= 6.9 grms. = 27.60 per cent.
mixed with some mica & undecomposed could not wash out.

Lab no 425. Pa Kaolin marked: "Crude No 2 Brandywine Summit Pa Collector National Kaolin Co"

For water, loss B.B. Talk. wt air dry = 2.0070
wt d @ 110°-115°C. 1.9946
wt C + 425 bfht. = 19.7649
wt C + 425 afht. = 19.7525
0.61(7)% at water = 0.0124
wt C + 425 bf ht B.B. = 19.7525
wt C + 425 af ht B.B = 19.6079
7.24(9)% wt loss B.B = 0.1446

Bi_2O_3 fusion wt D + NaCl + KCl = 14.1725
wt D = 14.1632
wt KCl + NaCl = 0.0093
K_2O = .00208 = 0.10% wt KCl = 0.0033
Na_2O = .00318 = 0.15% wt NaCl = 0.0060
wt K_2PtCl_6 = .0110
wt KCl =

For analysis wt air dry = 1.0028
(Decided Mn reaction) not strong. wt d @ 110°-115°C = 0.9967
wt SiO_2 = .71947 = 72.18%
20.97% wt $Fe_2O_3 + Al_2O_3$ = .20909
wt Fe_2O_3 =

wt CaO = .00169 = .16%

wt $Mg_2P_2O_7$ = Slight trace
wt MgO =

Note: Compared portion whole of specimen dried. White, kinked worm - salty - quartz grains through the mass, some as large as a pea.

~~wt $Fe_2O_3 + Al_2O_3$ after reprec., re-dissolv., reprecipt = .17509~~

=

* Note detern. Fe in Sep. portion, as well as in 20.97% portion.

Lab # 10425 Crude No 2 Parkdale.

For Fe air dry = .5094
dry @ 110°–115°C = .5063

$W Fe_2O_3$ = .007086 = ~~1.14~~ 1.39 %

20.97
1.39
19.58

Sand thro' sieves 20. 40. 60. 80. 100. 150

		grms.	Per cent		
Stopped on	20	0.29	2.74		
"	40	1.507	14.69		
"	60	2.762	26.06	Total	10.596
"	80	1.08	10.19		
"	100	1.91	18.03	88.21	
"	150	1.75	16.52		
Went thro' all		1.25	11.79		
			100.00		

Résumé of 425.

One Anal

Silica	72.18	per cent.	
Alumina	19.58	" "	2047
Ferric oxide	1.39	" "	
Lime	0.16	" "	
Magnesia	Slight trace	" "	
Potash	0.10	" "	
Soda	0.15	" "	
Loss on ignition	7.24	" "	
	100.80		

Water @ 110°–115°C = 0.617 per cent.

Air dry sand in 20 grams air dry Kaolin
= ~~6.9~~ grms. 10.63 = 42.52 %
Mixed with little mica or kaolinite could not wash out.
mostly quartz.

Chert.)

Lab No 426. Powder. Decomp Chert(?); marked: upper Bk Bayou 1 m. above Montgomery Mill Independence Co. Collector R. A. Penrose Jr.

Determine Silica, water, loss BB & qual. exam^tn

For water & loss BB

	wt air dry =	1.0010
	" dr @ 110°-115°C. =	0.9986
	wt C + 426 bf ht. =	9.1494
	wt C + 426 af ht. =	9.1470
0.23(9)%	wt water =	0.0024
	wt C + 426 bf ht BB =	9.1470
	wt C + 426 af ht BB =	9.1437
0.33%	wt loss BB =	0.0033

For Silica qual. exam^tn

wt air dry = 1.0048

wt dr @ 110°-115°C. = 1.0024

98.80% wt SiO_2 = 0.99042

O. C. R. B.

47

Résumé of 426.

Silica	98 80	per cent
Loss on ignition	0 33	" "
Total determ^d	99 13	per cent.
water @ 110°-115°C. —	0 23(9)	per cent.

Qual. analy. found small precip. for via d alumina; a little calcium; a little magnesia. Not exam^d for alkalies.

Check

Lab'y #27 – Porous baking spec. marked: "Upper Belt Bayou No. above Montgomery Mill Independence"

C. Collector, R. A. F. Penrose Jr.

Chips – ponded for analyses.

Determine Silica, water loss BB equal. analy.

For water loss BB – wt air dry = 1.0038

wt dry @ 110°-115°C = 1.0027

wt c + 42 grms aft = 9.7899

wt c + 42 grms aft = 9.7888

0.109% wt water = 0.0011

wt c + 42 grms aft BB = 9.7888

wt c + 42 grms aft BB = 9.7859

0.28(9)% wt loss BB = 0.0029

For Silica equal. analy. wt air dry = 1.0075

wt dry @ 110°-115°C = 1.0065

99.21% wt SiO_2 = .99862

O.K. P.W.B.

Résumé of #27.

Silica	99.21	per cent
Loss on ignition	0.28(9)	" "
	99.49	per cent
water @ 110°-115°C.	0.10(9)%	

Qual. analy – found small precip. for iron & alumina; a little calcium & magnesia. Not examd for alkalies.

Psolite –

Lab No 428. Psolite White Cañon: Marked: "Note book 27, page 37 NE ¼ of NW ¼ Section 10, 13 W, 1 S. 18 ft. thick Collector Wm Kennedy."

Determine silica, alumina, water
loss BB. Test for Vanadium – (J.C.B's direction)

For water & loss BB

wt air dry =	1.0103
wt dry @ 110°-115°C. =	1.0056
0.46(5) %	wt water @ 110°-115°C = .0047
13.68 %	wt loss BB = .1376
For silica & alumina	wt air dry = 1.0043
	wt dry @ 110°-115°C = 1.0001
45.75 %	wt SiO_2 = .45762
40.42 %	wt $Fe_2O_3 + Al_2O_3$ = .40429
	wt Fe_2O_3 =

Vanadium – Test filtrate from Fe + Al for Vanadium by boiling with sulphuric acid & zinc – in separating Fe out.

No Vanadium.

Respl.

Résumé of 428.

Partial analysis

Silica	45.75	per cent.
Alumina	39.09	" "
Ferric oxide	1.33	" "
Loss on ignition	13.68	" "
	99.85	

water @ 110°–115°C. — 0.46 per cent.

For Fe

wt air dry =	.5015
wt dry @ 110°-115°C =	

1.33 % Fe_2O_3
40.42
39.09

Pisolite

Lab N° 429 marked: "Notebook 21, page 9. May 5 1888. Between 2ta 1931 & 1933 Collecto JC Brannen."

Determine silica, alumina, water, loss B.B. & test for vanadium

For water & loss B.B. wt air dry = 1.0466
wt at 2 @ 110°-115°C = 1.0357

1.04 % wt water @ 110°-115°C = .0109
28.99 % wt loss B.B = .3003

For silica, alumina, vanadium — wt air dry = 1.0028
(very fine wt reaction) wt H_2O @ 110°-115°C = .9924

wt SiO_2 = .10062 = 10.180%

61.67 % wt $Fe_2O_3 + Al_2O_3$ = .61209
wt Fe_2O_3 = ~~.0301~~

Vanadium — Test for vanadium as in 428. No vanadium.

Résumé of 429 Partial analysis

Silica	10 13	per cent.
Alumina	55 59	" "
Ferric oxide	6 08	" "
Loss on ignition	28 99	" "
	100 79	" "

water @ 110°-115°C — 1.04 per cent.

For Fe wt air dry = .5003
wt H_2O @ 110°-115°C = .4951

wt Fe_2O_3 = .030119 — 6.08%

61.67
55.59

Resalite

Lead No. 430. Marked: Notebook 21, page 14. May 9, 1888.
Sta 33+41 and ½ way to 33+40 In small creek bed south of lane. Collector J. C. Branner

Determine silica, alumina, water, loss BB test for Vanadium.

For water & loss BB — wt air dry = 1.0478
wt dry @ 110°-115°C = 1.0438

0.19 % — wt water @ 110°-115°C = .0020
2.93 % — wt loss BB = .0307

For silica alumina & Vanadium test — wt air dry = 1.0154
wt dry @ 110°-115°C = 1.0135

wt SiO_2 = .66732 = 65.84 %
25.52 % — wt $Fe_2O_3 + Al_2O_3$ = .2586
2.70 % — wt Fe_2O_3 = .02746
2282

Vanadium — Test for Vanadium as in 429

0428

Résumé of 430 Partial analysis.

Silica	65.84	per cent.
Alumina	22.82	" "
Ferric oxide	2.70	" "
Loss on ignition	2.93	" "
	94.29	
Total determined.		
water @ 110°-115°C	0.19	per cent.

O.K. R.N.P.

Peridotite. J.C. Branner

Lab. No 431 - marked "Notebook 21 pg 15½
May 30. 1888. Station 43.65 Collector J.C. Branner"

For water loss B.B. air dry = 1.0090
dry @ 110°-115°C = 0.9918

1.70% water @ 110°-115°C = 0.0172
28.63 loss B.B. = 0.2840

For silica, alumina, ferric oxide — air dry = 1.0061
dry @ 110°-115°C. = .9890

11.48% SiO_2 = .11363
99.45% $Fe_2O_3 + Al_2O_3$ = .08799
1.83 Fe_2O_3 = .01816
57.62

For Reg KMnO4 2.05 c.c. = .01271 Fe
= .01816

Vanadium no reaction.

Resumé of 431. Partial analysis

Silica	11.48	per cent.
Alumina	57.62	" "
Ferric oxide	1.83	" "
Loss ignition	28.63	" "
	99.56	
water @ 110°-115°C	1.70	per cent.

R.R.B.
O.K.

Manganese Ore. R.A.F. Penrose Jr.

Lab No 432 — "G.D. Reaves, place, Independence Co. Collector R.A.F. Penrose Jr."

For water, loss B.B. ~~[illegible]~~. wt air dry = 1.0035
wt dry @ 100–110°C. = .9809

2.25%
.1204 = 12.27%
.1284 = 13.09%
wt water @ 110°–115°C = .0226
wt loss B.B. (& change B.B.) = {.1284 (greatest loss) / .1204 (least loss)}

For alkalies wt air dry = 2.0001
wt dry @ 110°–115°C = 1.9551

K_2O = .03904 = 1.99%
Na_2O = .01910 = .97%

wt dry + KCl + NaCl = 14.2610
wt dry = 14.1632
wt KCl + NaCl = 0.0978
wt KCl = 0.0618
wt NaCl = 0.0360
wt K_2PtCl_6 = 0.2025

For Phosphoric acid wt air dry = 2.0005
wt dry @ 110°–115°C = 1.9555

wt $Mg_2P_2O_7$ = .02069
0.67% P_2O_5 = .01323

For analysis wt air dry = 1.0000
wt dry @ 110°–115°C = 0.9770

0.83% wt SiO_2 wt insol. matter = .00812 (N.B. mainly SiO_2)
wt ~~$BaSO_4$~~ = ~~Ba~~ =
wt Fe_2O_3 + Al_2O_3 =
wt Al_2O_3 =

Note make filtrate up for Mn to 250 c.c.

50 c.c. wt Mn_3O_4 = .17219
50 c.c. wt Mn_3O_4 = .16577 } mean = .16898

3.16% wt Fe_2O_3 + Al_2O_3 = 0.03092 (slight Mn reaction)
.90% wt Fe_2O_3 = 0.00885
2.26% Al_2O_3
86.43% Total wt Mn_3O_4 = .16898 × 5 = .84490

1.23% wt CaO = .01209 (contains Mn_3O_4 = a little)
wt $Mg_2P_2O_7$ = } very slight trace
wt MgO = }

For Ba wt air dry = 1.0020
wt dry @ 110°–115°C = 0.9795
wt $BaSO_4$ = 0.00317
0.21% wt BaO = 0.00208

Test MnO_4 ppt for Ba — No Ba found

I For available oxygen — wt air dry = .2123
wt ppt @ 110°-115°C = .2076

wt CO_2 = .1913
wt avail. O = .0347 = $\left(\frac{1913 \times 15.96}{87.78}\right)$

II For avail Oxygen — wt air dry = .2125
wt ppt @ 110°-115°C = .2077

wt CO_2 = .1664
wt O avail. = .0302 = 14.54 %

Mean of II & III
avail. O II = 14.58
avail. O III = 14.54
2) 29.12
14.56 %

Résumé of 432

Silica (crystal. residue)	0.83	per cent.
Alumina	2.26	" "
Ferric oxide	0.90	" "
Manganese oxide, red (brown)	84.79	" "
Lime	1.23	" "
Magnesia	very slight trace	" "
Potash	1.99	" "
Soda	0.97	" "
Barium oxide	0.21	" "
Phosphoric acid	0.67	" "
Loss on ignition	13.09	" " *
Water @ 110°-115°C	2.26	per cent.

I For available oxygen —
wt CO_2 = .1604
wt O avail. = .0291 = 14.58 %

wt air dry = .2041
wt ppt @ 110°-115°C = .1995

Lab # 433. Mark "Peirce Place Independence Co Collector R.A. Peirce Jr."

For water loss BB ~~XXXX~~. wt air dry = 1.0035
wt d @ 110°–115°C = 1.0000

0.27% wt water @ 110°–115°C = .0028
3.33% wt change BB (loss) = .0334

For alkalies wt air dry = 2.0006
wt d @ 110°–115°C = 1.9902

wt O + KCl + NaCl = 15.7887
wt O = 15.7834

K_2O = .00208 = .10% | wt KCl + NaCl = 0.0053
Na_2O = .00106 = .05% | wt KCl = 0.0033
wt NaCl = 0.0020

wt K_2PtCl_6 = 0.0108 gm
wt KCl =

For Phosphoric acid wt air dry = 2.0012
wt d @ 110°–115°C = 1.9958

wt $Mg_2P_2O_7$ = .00789
0.25% wt P_2O_5 = .00504

For analysis wt air dry = 1.0016
wt d @ 110°–115°C = 0.9989

0.18% wt SiO_2 (Hirsel matter) = .00182 (NB mainly SiO_2)
wt $BaSO_4$ =
wt BaO =

wt $Fe_2O_3 + Al_2O_3$ = .00802 = 0.80% (Fe, Mn ppts)
wt Fe_2O_3 = 0.44 / .36
Percent Mn_3O_4 = 0.19817
99.24% Total Mn_3O_4 = 0.19837 } mean = .1982
Total Mn_3O_4 = .19827 × 5 = .9913 5
0.82% wt CaO = .0082 9 (Contains Mn_3O_4 = a little.
wt $Mg_2P_2O_7$ = } trace.
wt MgO = }

* Note make filtrate up for Mn to 250 cc.

SiO_2 // Ba / Fe Al Mn / Ca Mg /
with H_2SO_4
$(NH_4)_2S$
* make up

For Ba wt air dry = 1.0006
wt d @ 110°–115°C = .9979

wt $BaSO_4$ = .0037
wt BaO = .0024 34
= 0.248%

4333

Tested Mn3O4 prepared for Ba content Ba

I avail. O wt air dry = .2009
wt CO_2 = .1066 wt @ 110°-111°C = .2004
wt avail O = .0193 = $\frac{(.1066 \times 14.96)}{87.78}$
= 9.63%

II avail. O. wt air dry = .2002
wt @ 109-111°C. = .1997
wt CO_2 = .1035
wt avail O = .0188 = 9.41%

Mean of I + III = 9.63
9.41
2) 19.04
9.52

Remarks
Mn3 71.40
O 28

Résumé of 4333.

Silica (insoluble matter)	0.18	per cent.
Alumina	0.36	" "
Ferric oxide	0.44	" "
Manganese oxide Mn3O4	99.19	" "
Lime	0.82	" "
Magnesia	trace	" "
Potash	0.10	" "
Soda	0.05	" "
Phosphoric acid	0.25	" "
Barium oxide	0.48	" "
Loss on ignition	3.33	" "

Sept 14 for Resume

Water @ 110°-115°C = 0.27 per cent

For available oxygen — wt air dry =
wt @ 110°-115°C = ———

Pisolites) Dr. J. C. Brauner

Lab No 43 24 (a). Black (spots in red groundmass); marked: "Sec. 3, 2 S., 14 W. Collector J. C. Brauner."

For water, loss B.B. analysis sent for Vanadium:

At air dry	= 1.0006
At 2@ 110°–115°C.	= 0.9767

2.38% wt water @ 110°–115°C = .0239

17.39% wt loss B.B = .1699

Note – Grains brownish black from yellow from Black

22.02%	At SiO_2 =	= .21512
16.91%	At Residue after titrate with HF	= .16522
5.11%	At SiO_2 after treatment HF	= .04990
60.42%	At $Fe_2O_3 + Al_2O_3$	= .59019
17.91		
42.51	At Fe_2O_3	= .17495

Dissolve residue 16.91% in waterfree from with H_2SO_4 – filter of SiO_2
At SiO_2 from residue = none ∴ Total SiO_2 = 5.11%

14.92%	At $Fe_2O_3 + Al_2O_3$	= .14582
1.84		
13.38	At Fe_2O_3	= .01505

Vanadium – no reaction for; in filtrate from Metal or elsewhere.

Résumé 43 24 (a) Partial analysis

Silica	5.11	per cent
Alumina	55 89	" "
Ferric oxide	19 45	" "
Loss on ignition	17 39	" "
	97 84	
water @ 110° 115°C.	2. 38	per cent

Note: black spots only used.

Rio

Lab # 4 3 4 (b) Red (spots in red ferruginous matrix) marked "Sec. 3, T 8 S., R 14 W. Collected by J. C. Branner"

For water, loss B.B., analysis & test for Vanadium

wt air dry = 1.0034
wt @ 110°-115°C = 0.9850

1.83% wt water @ 110°-115°C. = 0.0184
26.68% wt loss B.B = 0.2628

Note: burned to dark color (from reddish brown) - brownish black

9.70% wt SiO_2 = .09562
4.81% wt Residue after treatment with HF = .04742
4.89% wt SiO_2 after (fusion & elimination) = 0.04820

63.54% wt $Fe_2O_3 + Al_2O_3$ = .62589
21.62 wt Fe_2O_3 = .21304
41.92

Vanadium — no reaction for.

Residue 4.81% - fused with $KHSO_4$ - dissolved in water & filtered - cool
wt SiO_2 from R = None ∴ Total SiO_2 = 4.89

5.05% wt $Fe_2O_3 + Al_2O_3$ from R from SiO_2 = .04982
.53 Fe_2O_3 = .00531
4.52

Résumé 4 3 4 (b) Partial analysis

Silica	4 89	per cent
Alumina	46 44	" "
Ferric oxide	22 15	" "
Loss ignition	26 68	" "
	100 16	per cent

water @ 110°-115°C — 1.83 per cent

Note Spots Red only, used.

Lite. Dr. J. C. B.

Lab No 433 Red Risolite - marked: "Sec. 9, T 8 S., R 14 W. Collector, J. C. Brauner"

For water, loss B.B., analyses & test for vanadium.

wt air dry = 1.0014

wt dry @ 110°-115° C. = .9859

1.54% wt water @ 110°-115° C. = .0155

28.63% wt loss B.B. = .2823

Not ignited brownish black powder. Not fused with Na2CO3.

17.43% wt SiO_2 = .17192 = .17192

14.09% wt Residue after heat with HF = .13892

3.34 wt SiO_2 after (repeated treatment with HF and reseparation) = .03300

53.07% wt $Fe_2O_3 + Al_2O_3$ = .52329

7.72 wt Fe_2O_3 = .07618

45.35% Al_2O_3

Vanadium not looked for

R. 14.09% fused with KHSO4 - dissolved in cold water - filtered -

wt SiO_2 = none ∴ Total SiO_2 = 3.34

14.64% wt $Fe_2O_3 + Al_2O_3$ from R from SiO_2 = .14442

1.39 wt Fe_2O_3 = .01373

13.25

Résumé of 433 Partial analysis

Silica	3.34	per cent
Alumina	58.60	" "
Ferric oxide	9.11	" "
Loss on ignition	28.63	" "
	99.68	

Water @ 110°-115° C. — 1.54 per cent

Manganese Ore R.A.P. Tr.

Lab No. 4/36 — Marked: "North Mt Montgomery Co. Collector R.A. Penrose Jr."

For water (Hoare B.B.) Alk. wt air dry = ~~2.0000~~

wt D @ 110°-115°C = 1.3870

wt water @ 110°-115°C = lost.

(wt Hoare BB) =

For alkalies + water — wt air dry = ~~2.0000~~

wt D @ 110°-115°C = 1.3875

wt D + NaCl + KCl = 14.5720

wt D = 14.1622

K_2O = .03051 = 2.12%
Na_2O = .03263 = 2.35%

wt KCl + NaCl = 0.1098

wt KCl = 0.0483

wt NaCl = 0.0615

wt K_2PtCl_6 = 0.1582

wt KCl =

For Phosphoric acid wt air dry = 1.4040

wt D @ 110°-115°C =

Grade

For analysis wt air dry = 1.0003

wt D @ 110°-115°C = .9907

0.15% wt SiO_2 (Insoluble residue) = .00157

wt $BaSO_4$ = 1.00082 Gram

0.054% wt BaO = .000538 "

0.98% wt $Fe_2O_3 + Al_2O_3$ = 0.06730

0.26% wt Fe_2O_3 = 0.00260 (very little)

6.5 2/3 Al_2O_3

Mn made up to 200 cc.

50 cc wt Mn_3O_4 = 0.20489

50 cc wt Mn_3O_4 = 0.19489 = MnO_2 (total) = .72499

2) .39978

mean = .19989

(MnO = 75.05% (mean)

" = 73.17 lowest take this)

(Total Mn_3O_4 = .79956 ≒ MnO = .74359)

Manganese Ores (Ref. P Sr.

Lab no 4 41/36 Carter — wt CaO + Mn_3O_4 = .01589 = 1.58%
Mostly manganese.

wt $Mg_2P_2O_7$ = None
wt MgO =

4 41/36 I avail. oxygen wt air dry = .2025
wt ○ @ 110°-115°C. —

wt CO_2 = .1686
wt Av. O = .0306 = $\frac{1686 \times 15.96}{87.78}$ = 15.11%

---

4 41. For water wt air dry = .4346
wt ○ @ 110°-115°C. =

0.96% wt water @ 110°-115°C = .0042

4 41 Swiss Soda reaction for cobalt.

Résumé 4 41/36.

	Silica	0.15 per cent
	Alumina	6.52 " "
Fe = 0.182%	Ferric oxide	0.26 " "
Mn = 56.66%	Manganese oxide (Mn_3O_4)	73.17 + 1.46 = 74.63%
	Lime (Containing some Mn_3O_4)	7.58
	Magnesia	None
	Potash	2.12 " "
	Soda	2.35 " "
P =	Phosphoric acid	trace
	Barium oxide	0.05
	available oxygen ~~Loss on ignition~~	15.11 " "
		101.31 per cent.
	Water @ 110°-115°C —	.96 per cent.

ORR & B Oct 16/820

Manganese Ores R.A.P. Jr

Lab No 24~~37~~42 - man rec'd: "Coosatat Mt. Polk Co., Collector, R.A. Penrose Jr."

For water (loss @ 110°) all. wt air dry = 2.0035
wt d @ 110°-115°C = 1.9956

0.39% ↑ wt water @ 110°-115°C = .0079
(% loss @ 110°) =

For alkalies wt air dry = 2.0035
wt d @ 110°-115°C = 1.9956

wt d + KCl + NaCl = 15.7967
wt d = 15.7804

K_2O = .00530 = 0.26% | wt KCl + NaCl = 0.0163
Na_2O = .00419 = 0.20% | wt KCl = 0.0084
wt NaCl = 0.0079
wt K_2PtCl_6 = 0.0276
wt KCl =

For P_2O_5 = wt air dry = ~~1.~~ 1.7785
wt d @ 110°-115°C =

none present. No reaction for P

For analysis wt air dry = 1.0000
wt d @ 110°-115°C = .9961

0.52% wt SiO_2 (insol. residue) = .00522

wt $BaSO_4$ = Not. { Sol. Sub. 1411.3
wt BaO =

1.85% wt $Fe_2O_3 + Al_2O_3$ = .0185
1.06% wt Al_2O_3 = .0104 (reacts for Mn)

Mn. made up to 250 cc) 50 cc. wt Mn_3O_4 = 0.16939 ∴ total MnO = .76906
50 cc. wt Mn_3O_4 = 0.16609 ∴ total MnO = .77231

0.52% wt CaO = .00519

wt $Mg_2P_2O_7$ = .00389
0.14 wt MgO = .00101

Manganese Ores A.A.S. Jr.

Lab No 4 42/37

4 42/37 1 av. oxygen.

wt air dry = .2208
" d @ 110°-115°C = ———

wt CO_2 = .2026
wt av. O = .0368

$\left(\frac{2026 \times 1.96}{87.78}\right)$ 16.66%

4 4 2 gives trace chromium & cobalt.

442 for $BaSO_4$ —

wt air dry = 1.00235 grm.
" d @ 110°-111° = .99845

wt $BaSO_4$ = 0.07309
wt BaO = 0.02829 — 2.83%

Résumé 4 42/37

Silica	0.52	per cent.
alumina	0.79	" "
Ferric oxide	1.06	
Manganese oxide (Mn O)	76.90	
Lime	0.52	" "
Magnesia	0.74	
Potash	0.26 (?)	" "
Soda	0.20 (?)	" "
Barium oxide	2.83	
Phosphoric acid	none.	
available Oxygen in Oxides	16.66	" "
	99.88	

Fe = 0.742
Mn = 59.55

= 77.20%
= 77.39%

water @ 110°-115°C — 0.39 per cent.

OK

Oct 16, 1890

Lab'y 4 ~~38~~ 40 marked:

For alum. Wt sulphuric acid (Concn) =
Wt latter dried dry = 68. above
Digested with concen. sulphuric acid in the cold
- poured into much water, filtered - filtrate
treated with ammonium sulphate - evap'd
to crystallization -

Wt alum obtained = 32.67 grms
= 48.04 per cent.

Note: Assuming the presence of 40% Al_2O_3
Have 68×40 = 27.2 grms Al_2O_3
equiring for sulphate of alumina $Al_2(SO_4)_3$
- 101.96 : 27.2 :: 239.68 : x
x = 63.91 grms SO_3

Then 79.86 : 63.91 :: 97.82 : x
x = 78.28 grams of H_2SO_4. (Concn) Sp gr 1.85
= 42.4 cc of H_2SO_4 (Concn)

Take 45 cc H_2SO_4 as to have slight excess.
Allowed to stand in contact with the acid & shaken
from time to time for a few minutes, much heat
generated & whole mass solidified - allowed to
stand @ 1/2 hr then added water & extract any
$Al_2(SO_4)_3$ formed.
Add 35.16 grms $(NH_4)_2SO_4$.

15 cc. H_2SO_4 = 26.08 grams for $(NH_4)_2SO_4$ 35.16
80 cc. NH_4OH = 18.64 " " " "

Added $(NH_4)_2SO_4$ in solution - filtered evap'd
to crystallization - washed crystals with distilled water
& dried them on top of air bath - inside of which was 130°C.
Wt air made alum $(NH_4)_2SO_4 \cdot Al_2(SO_4)_3 + 24(H_2O)$ = 32.67

By R. N. Brackett
Aug. 1, 1890

Miscellaneous

CO_2 Determinations —

Feldspar — CO_2 determination

wt air dry = 0.20215

I

wt @ 110°-115°C = 0.20114

wt CO_2 = .06965 = 34.62 %

II

wt air dry = .25975

wt @ 110°-115°C = .25846

wt CO_2 = .0864 = 33.428 %

III

wt air dry = .2086

(water = .50%) wt @ 110°-115°C = .2076

wt CO_2 = .0698 33.62 % CO_2

Mean of I. II. & III = 33.88 %

" of II & III = 33.52 % OK R & B

Take mean of all three.

Manganese ore — Richardo Mine California

specific gravity determination.

Coarse powder used for sp. gr.

wt ore coarsely powdered air dried = 1.000 gram

wt bot (sp gr) + Mn ore = 41.5880 gram

wt bottle (sp gravity) = 40.8535 "

wt in water flask = 0.7345

Ore { wt in air = 1.0000 gram
wt in water = 0.7345 "
Loss of wt in water = .2655

sp. gr.

3.76

.2655) 1.0000

2965

20350

18585

17650

Waters

Lab No 439 — water qual — analysis.
Marked # 27 E 22nd St.

Wt D + G 39 FS. =
Wt D = Omit
Wt FS =

Came in old Bordeaux bottle thus marked

water, slightly cloudy, slight sediment in bottom of bottle
Odor & taste very bad. Reaction neutral to litmus paper.

Found decided reaction for Chlorine
no sulphuric acid or barium
Very strong reaction for iron.

Got fresh specimen of water in glass stoppered bottle —

70 cc. Wt D + FS = 14.1796
Wt D = 14.1626
17.0 grs. p. Imp Gallon Wt FS = 0.0170 = 14.16 grs per U.S. Gal.

Loss on ignition = .0076 grams. = 7.68 grs. per Imp Gallon = 6.39 grs per U.S. Gal.

Odor & taste very bad. Reaction neutral to litmus paper — Slight scum on the water & water a little cloudy.

The water itself gave:

Chlorine — strong reaction.
Sulphuric acid — none
Iron — strong reaction
Barium } none.
Lead }

Water turns brown on evaporation.

A residue from evaporation of the water showed:

Yellowish brown color — effervesces with acids — gives odor somewhat resembling acetic acid — reacts for H_2SO_4 — strong for Iron — So likely the Content of the water is mainly: Carbonate of Iron & Chloride of sodium with much organic matter. Also contain a little manganese. Sulphate

Phenomena on ignition — Gave off slight fumes & strong odor of burnt organic matter, turning black. Black matter burning off leaving dark colored matter (Iron oxide)

Grains of ig. = 17. grs. per Imp Gal. = 14.16 grs per U.S. Gal.
" af. ig. = 9.4 " " " = 7.83 " " " "
Loss on ig. = 7.6 " " " = 6.33 " " " " — mostly organic matter.

Alum — Bauxite

Tube No 40 ~~38~~ Alum from Bauxite —
Method Wagner's Jeck Chem. Lab. 258, 260

½ Bauxite dry = 25.00
½ Carb. Soda = 35.00

If B. 60% $Al(OH)_3$ = 15 grms. requires
$2 Al(OH)_3 : 15 :: 3 Na_2CO_3 : x$
$x = 30.6$ grms. Na_2CO_3 for formation of $Al(ONa)_3$. Add to take 5 grms more to take up impurities = 35 grams Na_2CO_3.
Ignited with Carb. Soda. extract with water — decant. precip. with $NaHCO_3$ — decant — dissolve $Al(OH)_3$ in dil. H_2SO_4 Required 48.4 grms. $NaHCO_3$ *
28.2 " H_2SO_4
or 15.2 cc H_2SO_4 for dil. of 15 grms. $Al(OH)_3$. —

* actually used only 4 8.4 − 7.48 = 40.92 grams. NH_4HCO_3
Req'd 12.67 grms $(NH_4)_2SO_4$
Req'd NH_4OH 6.7 grms. = 10.8 cc. NH_4OH or 11. cc. grms
H_2SO_4 9.4 grms = 5.08 cc. H_2SO_4 or 5. cc. grms.

Wt alum ammonia obtd = 21.17 grms.

Proportions for 100 lbs Bauxite
100 lbs Bauxite
140 lbs Sod. Carb.
164 lbs ~~Sod~~ Bicarb
113 lbs Sulph. a cit (Conc.)
51 lbs Sulp. ammonia.
Furnish 85 lbs am. alum.

Lab no 432 – In thes on p. 132 – barium oxide & Phosphoric are omitted twice – for the barium

Comes out of CaO – 1.23 % & phosphoric acid at of (via 4)
alumina – To analysis should read:

Analysis of specimen dried @ 110°–115°C –

Silica	0	83	per cent
1* Alumina	0	80	
Ferric oxide	0	90	
Manganese Monoxide	7	85	
2* Lime	1	81	" "
Magnesia	very slight trace		" "
Potash	1	99	" "
Soda	0	97	" "
Barium oxide	0	21	" "
Phosphoric acid	0	67	" "
	101	59	

CC Rutley Aug 6/1890

water @ 110°–115°C	2	26	
Mn = 61.06		Fe = .63	
P = 0.29			

2* $CaO = (1.23 - .21) + .79 (= CaO \text{ for } .67 P_2O_5) = 1.81$

1* $Al_2O_3 = 2.26 - [.79 + CaO (\text{for } P_2O_5 .67) + .67 P_2O_5] = .80$

Note. Lime & alkalies probably a little high.

R. Rutley

In the above analysis Mang. probably at least 1% too high. Total should be 100.59.

Lab No 433. In this p. 134 - Barium & phosphoric acid counted twice. So should have

Braunite

Analysis of spec. d @ 110°-115°C. —	gave			
Silica	0	18	per	cent
Alumina	0	11	"	"
Ferric oxide	0	44	"	"
Manganese monoxide	92	24	"	"
equiv. oxygen	9	52		
Lime	0	34	"	"
Magnesia	trace		"	"
Potash	0	10	"	"
Soda	0	05	"	"
Barium oxide	0	48	"	"
Phosphoric acid	0	25	"	"
Total	103	71		
water @ 110°-111°C	0	27	per cent	
Metallic Manganese =	71.	40	"	"
" Iron =	0	30	"	"
Phosphorus =	0	10(9)	"	"

Contg Mngs 67.70

Note: Manganese must be a little high & also barium.

433 Redeterm^n of Manganese

(1) 50 c.c. (250 cc vol.) gave Mn_3O_4 = 0.21039 Gms.

(2) 50 c.c. (250 cc vol.) " Mn_3O_4 = 0.20709 Gms.

Before I " " " " = 0.19817 "

II " " " " = 0.19837 "

Manganese redetermined by Norges. H.a. Jones Hamilton Co

He found Mn = 67.70

avail. O = 9.26 (2)

71.40
67.70
3.70

So total assay should be 103.71 − 3.70 = 100.01

The Mineral is Braunite according to Penrose.

F. C. Hopkins

Lab. No 444. Gray marble marked: "State Book 101, page 46. 3/7/90. Forks of Creek Marshall Prairie branch. Magness Mill. Section 24, 17 N., 19 W. F. C. Hopkins Collector."

Qualitative analysis.

For qual. analysis took about 1 gram.

Consid. White siliceous residue insol. in dil. HCl.

Residue.

Solution.

Slight b. for Fe + Al; and very little Mgnesia.

In qualitative examination shows specimen to be a very pure marble containing a little silica iron + alumina + magnesia; with no barium or strontium. Faint reaction for manganese.

(OK) R.N.B. Oct 3/890.

H. C. Hopkins

Lab. No. 445. Light gray marble marked: "Note book 101, page 14. 2/20/'90. S.W. 1/4 of S.W. 1/4 Section 27, 16 N., 20 W. Branch of Flat Rock. Collector H. C. Hopkins."

Per cent of lime.

wt air dry = 1.0023
wt d @ 110°-115° C. = 1.0015

.079 % wt water @ 110°-115° C. = .0008
43.36 % wt loss B.B. = .4343
0.20 % wt Residue insol. in dil. HCl = .00202
made solution up to 200 c.c.

Total % CaO = 56.41 % | 50 c.c. of lime = .14124 grams Total CaO = .56496
" " = 56.55 % | 50 c.c. of lime = .14159 grams. Total CaO = .56636

2) 112.96
56.48 per cent mean of two determinations.

O. C. R.

Resumé of 445.

Insol. in dil hydrochloric acid.	0.20	per cent.
CaO = 56.48 % Calcium Carbonate	100.84	" "
Total	101.04	" "
Water @ 110°-115° C.	0.079	per cent.
Loss B.B. after drying @ 110°-115° C.	43.36	per cent.

O. C. R.

Oct. 7, 1890
Mrs. Pope
Clear Spring

H. C. Hopkins

Lab. No. 446 Red marble marked: "Notebook 101, page 44 3/6/'90. Near Duggei's Mills Section 18, 17 N., 18 W. Collector H. C. Hopkins."

Test for Mn & determine quantitatively, if any present.

Very - very faint reaction for manganese.
Slight brownish residue insol. in dilute HCl

Residue for Mn - very faint react. for manganese, rather strong for iron.

Solution for Mn. (OK R)

No precip. with $(NH_4)_2S$, NH_4Cl, NH_4OH —

So no Mn or Fe.

wt air dry = 2.0060 grams
wt dry @ 110°-115°C = 2.0028 "

wt water @ 100°-110°C = .0032 = .15%

Mean Fe_2O_3 = .53%
Ref .44%
Mean right RNB

For Fe

1° wt Fe_2O_3 = .0123 = .61% 2° wt Fe_2O_3 = .0088 = .44%

Make up to 100 cc.

Lab. No. 447. Red marble marked: Notebook 101, page 46. 3/6/'90. Forks of creek in N.E. ¼ of N.E. ¼ of section 24, 17 N., 19 W. Weston Grove. Collector H. C. Hopkins

Test for Mn & determine quantitatively, if any present.

Very faint reaction for manganese.
Considerable brown residue insol. in dil. HCl.

Residue for Mn - no manganese reaction.

Solution for Mn

A precip. greenish black with $(NH_4)_2S$, NH_4Cl, NH_4OH.

For Fe. wt air dry = 2.0063 grms
wt dry @ 110°-115°C = 2.0015

.23% wt water @ 110°-115°C = .0048

Make up to 100 cc.
1° wt Fe_2S_3 = .01186 = Fe_2O_3 = .01122 = 1.06%
2° " Fe_2S_3 = .01780 = Fe_2O_3 = .02584 = 1.26%

Take latter, more correct

(OK R)

H. Hopkins

Lab No 448 Red & green marble marked: "Note book 102 page 163. 3/4/90. Hog creek S.E. ¼ section 3, east of crossing of the road from Valley Springs to Western Grove. Collector J.C. Hopkins"

Test for Fe & Mn & determine in the two colors separately – red & green.

Red – Determination run only. No reaction for manganese

wt air dry = 1.0006

Req'd 2.4 cc KMnO4

1 c.c. KMnO4 = .00619 grams Fe (iron).

wt Fe = .014856 grms

2.12% Fe_2O_3 wt Fe_2O_3 = .02122 grms.

Green. Fe iron only – no reaction for manganese.

wt air dry = 1.0001

Req'd 1.35 c.c. KMnO4

wt Fe = .008356 grms

1.19% Fe_2O_3 wt Fe_2O_3 = .011936 grams.

OK R.N.B 30 Oct 1890

Lab No 449. White crystalline specimen marked: "Section 14, 20 N, 17 W. Collector J.C. Hopkins".

Test for Strontium.

(Almost) Entirely soluble in HCl with strong effervescence.

The material dissolved in HCl gave no flame reaction for Strontium.

No Strontium.

OK R.N.B Sept 30/1890

III

Lab'y # 41. Augusta Little Rock bauxite

wt air dry = 1.0005

Water 0.15% wt @ 110°-111°C = .9990

Dissolve in HCl

62.92% wt Residue = 0.62862 Gram

Fusn treat. with K_2CO_3 / Na_2CO_3 } wt SiO_2 =

wt $Fe_2O_3 + Al_2O_3$ =

wt Fe_2O_3 =

8.11% wt CaO (Al_2O_3) = .08109

Solution:

43.23% wt SiO_2 = 0.43192 Mean of 3 - 44.55%

41 III R wt $Fe_2O_3 + Al_2O_3$ = .08059 Gram

41 III Sol. " " " = .18599 "

6.78% wt CaO (Al_2O_3) = .0778

15.89% Total CaO (Al_2O_3) = .15889

3.11% wt Al_2O_3 = .03109

12.78% wt CaO = .12780

wt $Mg_2P_2O_7$ + Ak

wt MgO =

wt Al_2O_3 =

wt Al_2O_3 phosphate

41 III R III Al_2O_3 = .00807 Gram.

411 — Sand Black Manganese.

Resumé of 411.

Silica	44.55	per cent.
Alumina		
Ferric oxide		
Ferrous oxide		
Lime	12.78	
Magnesia		
Potash	0.97	
Soda	1.85	
Phosphoric acid	9.57	
Loss by ignition	1.10	
Total		
Water @ 100° – 115°C.	0.15	per cent.

Testing S.S. $KMnO_4$.

I wt Fe = .29685
= .29625 corrected.
Reqd 47.3 cc $KMnO_4$
1 cc $KMnO_4$ = .00626 gm Fe.

II wt Fe = .2727
= .27215 corrected.
Reqd - 43.95 cc $KMnO_4$
1 cc $KMnO_4$ = .006192

Take II as more correct.
∴ 1 cc. $KMnO_4$ = .00619.
Oct. 2, 1890. R. N. [illegible]

Experiments on the Solubility of some hydrous silicates of Aluminum in Sulphuric acid.

Lab № 349 wt air dry = 0.5001 Finely powdered.
Treated with 10 cc. Conc. Sulphuric acid – digested for 3 hrs on sand bath then boiled @ 5 mins. Diluted, washed residue + boiled with 20 cc. saturated solution of Na_2CO_3 – till very Conc? + Paper disintegrates – Then add 20 cc. water + boiled again. Diluted + warmed filtered, washed with hot water, dil. HCl, + finally with water hot + cold.

1.429% wt Residue = .00715 grams

Treat № 323 Labels "Note book 99, Pages 26 & 27) Feb 3, '90
Collector J.C. Branner
wt air dry = 0.5004 Finely powdered
Treated with 10 cc Conc. Sulphuric acid
Digested for 3 hrs Sand bath, then boiled @ 5 mins.
Treated as in 349

2.77% wt Residue = 0.0139

Lab № 393 Pike Co. Kaolin.
wt air dry = 0.5002 Finely powdered
Treated with 10 cc Conc. Sulphuric acid.
Digested for 3 hrs on sand bath then boiled @ 5 mins. Treated as in 323

4.558% wt Residue = 0.02278 grams.

Experiments on solubility of some hydrous silicates of alumina in caustic potash and soda solution.

Lab No 349 wt air dry = 0.5000 gms. Finely powdered.

Treated with 10 cc KOH solution – boiled – diluted – some seemed to dissolve a little but came out on diluting – add 10 cc KOH more boil & filter hot. Contained some K_2CO_3, as bled copious gas after first boiling. After 2nd boiling, filtered through Gooch – part left in flask undissolved – added filtrate boiled again, & all when filtrate passed thro', washed with water hot & dil. HCl –

wt Residue dried @ 110°–115°C = none.

The residue after treatment with KOH & washing with water in which it appeared insoluble – dissolved completely in dil HCl

Residue left after washing out most KOH dissolved in acid dil. HCl – gave $Al(OH)_3$ reaction with KOH –

Lab No 323 wt air dry = 0.5000 gms. Finely powdered.

Treated with 10 cc KOH solution &c as in 349, as far as first boiling. After the first boiling allowing to stand, diluted with water, filtered through ash-less paper – washed thoroughly with water hot with dil. HCl as long as anything dissolved – washed by decantation – residue dissolved readily in cold dilute HCl.

wt Residue after evaporating to dryness dried @ 110°–115°C =
of Silicic Acid

Remarks: What is the white ppt formed? Needs investigation Ref. 13
Same remarks apply to 349.

Lab No 393 wt air dry = 0.5000 gms. Finely powdered.

Treated with 10 cc KOH solution.

Residue after thoroughly washing with water dissolved in dil. cold HCl, from this only aluminum hydroxide was precipitated with ammonia, proven as aluminum by appearance of fusion of ignition with Cobalt nitrate. – filtrate from $Al(OH)_3$ – treated to dryness – HCl driven off – residue found to be largely K – with H_2PtCl_6 & alcohol.

In this case the ppt formed by action of KOH would seem to be one containing Aluminum, potash, & probably silica

Exper. Contd — Sol. of H_2SO_4 Sol.
Ac. in H_2SO_4 & KOH —

Leaf No 107. wt air dry = 0.5006 in flakes

Treated with 10 cc H_2SO_4 conc.
Digested 3 hrs a sand bath — then boiled @ 5 min —
Treated as in 349, 393, 323 — p. 155.

2.85 % Wt Residue = 0.01280

Leaf No 107 wt air dry = 0.5006 in flakes.
Treated with 10 cc KOH. Treas. in 349 etc.
A little dissolved in dil. cold HCl., but the greater part of the material which was in the scales seemed to have escaped the action of KOH for it did not dissolve even on heating in dil HCl. — in conc HCl.

Wt Residue = .24539 grams
ignited
= 49.01 %.

Results with H_2SO_4 Conc. & removal of silica with K_2CO_3:

Number		Insoluble residue in %
349	Newton County	1.43 per cent
323	Pulaski "	2.77 " "
393	Pike "	4.55 " "
107	Garland "	2.53 " "

49.01
51.99

158 Blk Washita & Arkansas stones for fixed carbon & vol. matter.

4664 358. Black Washita – 10 mile quarry Collector L. S. Griswold.

wt air dry = 2.0031

wt C + 464 after B.B. =

wt C + 464 after B.B. =

wt loss B.B. =

wt C + 464 after heating = 2.0

wt C + 464 after heating =

wt loss in air (fixed carbon) =

wt air dry for loss in Cod Cuc = 2.0345

wt loss in Cod Cuc = .01375

Total loss on ignition in air = 0.6875 / 0.6875 − 0.006 = 0.6815

4665 373. Black Arkansas stone. Collector L. S. Griswold.

wt air dry = 2.1589

Total loss on ignition in air B.B. = 0.088 per cent.

loss on ignite in Cod Cuc. H₂O =
= water expelled

Fixed Carbon =

wt air dry (for loss in Cod Cuc = 2.0103

0.092 % wt lost in Cod Cuc = 0.00185

0.114 % Total wt lost on ignition in air = 0.00230

0.022 % Fixed carbon .00065

O.C. R.A.B. Oct 6/1890

Lab. No. 42. Brownstown Clay —

Collected. J. C. Branner

wt air dried for sand = 25 grams.

wt air dried sand = 9.25

Hence sand fine white = 37.00 per cent.

March 31/91. R.A.B.

6 Exp't — action of Nitric acid on Blk Arkansas & Washita —
Oct. 8, 1890.

358 Blk Washita — Chip —
Conc HNO_3 1 : H_2O 499

373 Arkansas Chip
Conc. HNO_3 1 : H_2O 499

Penrose Sp. Gr.

Spessartite —

	wt (Bot + water) + Spessartite =	40.7279
	wt Bot + water =	40.1883
	wt spessartite immersed =	0.5396
a	wt air dried powdered spessartite =	0.7326
b	wt immersed " " =	0.5396
c	wt Lost in water =	0.1930

$\frac{a}{c}$ = Sp. gr.

.193) .7326 0 (3.79
579 8
1536
1351
1850
1737

R. A. P.
April 15, 91.

Lot No 467 – Bateville – Is it silicate? R.B.R.Jr.

Partial qual. examination: Contains:
Manganese – Pt. foil Na_2CO_3 & KNO_3 – blue fine. ostrich.
Iron – yellow solution in HCl
Residue from treatment, boiling with HCl conc. reddish brown in color, consisted of:
Manganese – reaction very faint – with Na_2CO_3 & KNO_3 and there is none with borax bead.
So there may be a trace of silicate of manganese – but the mass of material not manganese silicate.

What is bright crystd. formed on fusion with Na_2CO_3 & KNO_3 – in drops?

Residue is silicate but silicate of manganese & contains ~~a little~~ iron also.

Ask Penrose for more material may be interesting! R.B.R. Oct 10, 1890.

Sol. of fusion, with Na_2CO_3, KNO_3 of residue from HCl, in HCl gives yellow color reacts for iron; no precip. with H_2S; with $(NH_4)_2S$ black ppt.

R.B.R.

Penrose Manganese.

Lab No 318 – Golconda Pebby Quartz – R.A.P.J.
For manganese only.

wt air dry = 1.0003 grams.

Reaction for manganese strong
Dissolved in Conc. HCl – residue slight manganese reaction

Determ only Mn sol. in HCl.

2.52% as Mn_3O_4 = 1.02529 grms.

Mn = 1.98%

RAP Oct 17/99

319 (Lab No) – Lava 10 m. east of Golconda R.A.P.J.
For manganese only.

wt air dry = 1.0005 grams.

Reaction for manganese weak.

Dissolved in Conc HCl – residue ~~slight~~ no reaction – more than in 318. Probably some silicate Mn here.

Determ only that sol. in HCl

0.49% as Mn_3O_4 = 0.00499

" Mn = 0.38%

1.0005) 4.9900 (.49
4 0 0 2 0
9 8 8 0 0

77.44
.49
6 9 6 9 6
3 0 9 7 6
.3 7 9 4 5 6

RAP Oct 17 1899

Griswold work

Lab no 468 — Quartz crystals, small clear pcs near Arcadelphia Ark.

Feb. 4 '91

wt air dry = 1.0403 grams.
wt @ 110°–115°C =
wt water @ 110°–115°C =
wt loss B13 =

Jakeby diff.] wt SiO_2 = 1.0393 (redetermine!) I

wt $Fe_2O_3 + Al_2O_3$ = .0039 2

wt CaO = Trace

wt $Mg_2P_2O_7$ =
wt MgO = Trace

Alk.

wt air dried = 1.1946 grams.
" dr. @ 110°–115°C =
~~wt KCl~~ + NaCl = 0.0043 grams
Na_2O = .0039 wt KCl = none
wt NaCl =
wt K_2PtCl_6 = none

Resumé (calc'd air dried)

* Silica	99.31	
Alumina }	0.37	per cent
Ferric oxide }		
Lime	Trace	
Magnesia	Trace	
Potash	none	
Soda	0.32	
Loss on ignition		(0.15)
	100.00	

(II For SiO_2 — wt air dried =)

Mar ch 2 1891 Bascom Griswold

* SiO_2 by difference

Gris wold work.

Lab № 469 — Quartz — capture chips JBC —

Feb 4 '91.

wt air dry = 1.0154 grams.
wt @ 110°/115°C =
wt water @ 110° – 115°C =
wt loss BB =

Smelted. wt SiO_2 = 1.9933 (redetermine) ! I

wt $Fe_2O_3 + Al_2O_3$ = .0282 gram

wt CaO trace

wt $Mg_2P_2O_7$ =
wt MgO = trace

Alk.

wt air dried = 2.0060 grams.

wt KCl + NaCl = .0095
wt KCl = none
wt NaCl =

NaCl = .0098

wt K_2PtCl_6 = none

Reduced. Calcd air dried

		per cent.
*Silica	99.54	
Alumina, Ferric oxide	00.27	" "
Lime	trace	
Magnesia	trace	
Potash	none	
Soda	0.19	
Loss on ignition		(0.06)
	100.00	

RPB March 3 1891

II For SiO_2 — wt air dried = 0.5027 gram

wt SiO_2 = .5021 2 99.88 %

* SiO₂ by difference

Penrose silica

Shale up for months with water (distilled) - rolled by wind mill - (See Mr. Penrose notes)

I SiO_2 Impal-powder

wt air dry	= 1.31870	
wt of B.B. blowpipe	= 1.31322	
wt lost B.B.	= 0.00488	= 0.37%
wt lost B.B. by air dry powder from original material		= 0.06%

Remarks. I SiO_2 was filtered into a small quant. paper - dusted out with filter pump some time then allowed to stand in the air from Oct. 7 pm. - Oct. 15 A.m. - being covered to keep out the dust &c. then put on bal. pan, another paper put like it in other pan ones added till Equilib. established.

II SiO_2 2.80%

wt air dry	= 2.03200 grams.	
wt of B.B.	= 1.97492	
wt lost B.B.	= .05708	

III SiO_2 2.72%

wt air dry	= 2.03890	
wt of B.B.	= 1.98932	
wt lost B.B.	0.04958	

Filtrates from these Experiments thrown away on account of impossibility of filtering them clear for determination of SiO_2 dissolved if any.

Kaolin Series —

Supposed first member.

Lab. No 107 — wt air dry = 1.0160 grams.

Digested with Conc HCl 2-3 hrs sand bath, diluted, filtered by decantation, boiled with residue with Na_2CO_3 to remove silica; collected residue on f.p. washed with water, dil. HCl finally with water again. (~~Dried on f.p. at 110°-115°. ignited as SiO_2 by ff. wts for counter poise to equilibrium~~.) Ignited before blowpipe

wt air dry	= 1.0160 grams.	
wt. dry @ 110°-115°C	=	Omit.
wt. water @ 110°-115°C.	=	
wt lost B.B. + by HCl + Na_2CO_3	0.2162 grams	*
I wt after dry ig B.B.	= 0.7998 grams	
(per C = 17.7333)		

21.2% on air dry sample

Fused in the with Na_2O_2 & Na_2CO_3.

(57.15%)	wt SiO_2 = 1.45712 grams.	57.10% (wt. B.B. .8004)
(40.53%)	wt $(Fe_2O_3) + Al_2O_3$ = 0.32442 grams.	

	I Calculated on material dried B.B.	II Original air dry
SiO_2	57.10 per cent	44.98
Al_2O_3 (Fe_2O_3)	40.53 " "	31.93
Loss on ignition		
Total	97.63	76.91
Loss on ignition	(by difference)	23.09
		100.00

* Better & more Correct are following figures

wt. C + 107 dry ig. B.B. =	18.5353 grams
wt C	= 17.7347 "
wt after ig. B.B. =	0.8006 grams
wt fps.	.0002
wt after ig. B.B.	0.8004.
Loss on ig. B.B. =	0.2156

Kaolin series
Supposed first member

Originale materiale weight air dried 1.0160 grams.
Dried B.P. after treatment with HCl (acc) & Na_2CO_3 — 0.8004 "

[$Al_2O_3 . 2SiO_2$ Composition % — $2SiO_2$ — 54.03
Al_2O_3 — 45.97
Total 100.00]

Lab No 498. Specimen from Senator Rodmine —
Calcite colored brown with oxide of iron

Feb 1891

Lab No 497 Specimens from Hon S J Crabtree —
(1) Micaceous Sandstone: No gold or silver
(2) Mixture of Galena — not argentiferous
Pyrites " auriferous
Zinc blende — a little

Lab No 497

Lab No 495. Iron Ore from Hon D B Green —
wt air dried 1 grm. for Fe, SiO_2 & Mn. —
wt Fe = .1302 = 13% (13.61)
wt Mn = = 4 (4.03%)
wt SiO_2 & insol. = .608 = 61% 60.80
wt P = .00093 grms. = 0.046% 0.046
2 Grams for P.

Lab No 496 Specimens from Hon. Lawrence Russell.
A black compact — pyrites & limestone or sandstone
(1/10 A.T. for gold & silver — Assay)

10 grams — grad. assay for gold & silver — no silver & gold

B. brown porous — iron ore
(2/10 A.T. for gold & silver Assay)

Lab No 496 — B — 5 grms for qual and gold
Silver &c. Native gold.

Lab No 497 Arvada Locality — Iron ore.
Fe = 32.58% 1 grm taken.

(Conglomerate with limonite for grind portion take for Fe.)

R. A. B. Feb 25 1891

Lab No 499 — Galena — ~~Denver~~ Van Zandt Flippin Mining Co.
?

Assay test showed no silver.
(for assay 1/10 A.T.)

Feb 27 1891

Lab. No. 240 — Zinc ore — for Dr J. Brunner
Locality Electricity

wt $ZnCO_3$ = $ZnCO_3$ = %
wt ZnO = ∴ ZnO = %

Residue insol. in HCl very slight composed of silica mainly

Little or no lime; no potassium —
Magnesia —
Alumina & Iron not much little.
Sodium — present.

The ore is Zinc Carbonate. Smithsonite

II wt air dried for Zn = 0.2046 grams
wt ZnO = 0.12919 " 63.09%

III Wt air dried for Zn = 0.2025 grams.
wt ZnO =

March 14, '91 R. A. B.

Penrose - Manganese Ores
Complete analyses.

Lab. No 470. "Richard" mine, 12 miles east of Tracy, California "R.A.F.B. Jr. Complete analysis"

For Ba & Alk & Residue wt air dry = 2.0010
wt dry @ 110°-115°C = 1.9533

Ba Barium.

wt Residue = 0.03852
In Sol. wt of ppt NaCl+KCl = 15.8075 } In R.
wt Ba = 15.7797
wt KCl + NaCl = 0.0278
K_2O = .00382 = 0.195% | wt KCl = 0.0062
Na_2O = .0115 = 0.58% | wt NaCl 0.0216
wt $MgNH_4PO_4$ = 0.0202
wt KCl =

For P_2O_5 2.0004 grms - air dry - Na P_2O_5
For water & analysis wt air dry = 1.0044
wt dry @ 110°-115°C = 0.9805

2.39% wt water @ 110°-115°C = 0.0239

Treated with conc. HCl.

1.98% wt Residue = 0.01942 (fusion with K_2CO_3 Na_2CO_3 short heat blast)
wt $RSiO_2$ = 0.02022 So Calc all 1.98 SiO_2
wt R Fe_2O_3 + Al_2O_3 ✓ trace

wt R Mn_3O_4 ✓ trace
wt R CaO } undet.
wt R $MgNH_4PO_4$ }

3.26% Solution — wt S. Fe_2O_3 + Al_2O_3 = 0.3202
.6314 = Calc all FeO_3
(Vol 6250 cc.)
Wt. MnO = .74906 = 75.37 | 50 cc wt S Mn_3O_4 = 0.16109, Tot. Mn_3O_4 = .805345
" " = .7536 = 75.06 | 50 cc wt S Mn_3O_4 = 0.15829 " " = .79145

3.10% wt S CaO = 0.03049 grms.
wt S $Mg_2P_2O_7$ = .01529
0.56% wt S MgO = 0.00554

I

4 70 av. Oxygen.

Wt air dry = 0.2041
" " @ 110°-115° C = 0.1993

Wt K_2CrO_4 used = 0.5 gram

wt CO_2 = 0.0762

$$\frac{.0762 \times 13.96}{87.78} = .01385 = 6.94\%$$

H 70 for loss ig. Wt air dry = 0.1466
Wt @ 110°/115°C = ——

Total wt loss ig = 0.0777
wt water = 0.0105
wt loss ig = 0.0672 — 15.40
av. oxygen — 6.94
8.46

Resumé of 470.

SiO_2	1 98	per cent	
Al_2O_3	none	"	"
Fe_2O_3	3 26		
MnO	75 26	"	"
MgO	0 56	"	"
CaO	3 10	"	"
BaO	none	"	"
P_2O_5	none	"	"
K_2O	0 19	"	"
Na_2O	0 58	"	"
O av.	6 94	"	"
Co			
Ni	not looked for		
Loss ig mat	8 46		91.87%
	102 33		

Penrose Manganese Ores.

Lab No 471. "Manganese ore Golconda, Nevada. R.A.Hoff. Complete analysis".

For Alk Ba & Residue. wt air dry = 2.0016
wt dry @ 110°-115°C. = 1.9021

Treated with HCl.

5.69% (yellow crystalline) wt Residue = 0.1082 } {on fusion with K_2CO_3 $NaCl_3$ green!
1.70% — R_2O_3 SiO_2 = 0.03242
2.78% — wt $CaCO_3$ = 0.05288
Sol. wt $BaSO_4$ = 0.16382
5.65% wt BaO = 0.10758
Sol. wt NaCl + KCl = 14.1724
K_2O = .00662 = .35 wt $CaCO_3$ = 14.1616
Na_2O = wt NaCl + KCl = 0.0108
wt K_2PtCl_6 = 0.0402
Calc all KCl

For P_2O_5 — 2.0015 grams. No Phosphoric acid.

For water analysis wt air dry = 1.0007 grms
wt dry @ 110°-115°C = 0.9509 "
4.97% wt water @ 110°-115°C — 0.0498 grms.

Treated with HCl Conc.

5.55% wt Rubbish (yellow crystalline) = 0.05282 {on fusion with K_2CO_3, Na_2CO_3 green.}

Remark — the fusion dissolves in water with green color. — with HCl sol specimen pink (Mn) — probably all color due to Mn. on further addition of HCl, white precip. turns yellow on boiling (W = tungsten). —

Rest SiO_2 = omit.
Rest W_2O_3 =
R_2O_3 $Fe_2O_3 + Al_2O_3$ =

Loss of wt air dry = 6353 MnO_2 =
wt dry @ 110°-115° = .6038

Mn — trace

For loss of = .1189
water = .0315
loss of = .0874 = 14.47
av. oxygen = 10.31
4.16

CaO

$Mg_2P_2O_7$ =
MgO =

471 — Continued.

Solution —

Wt MnO = .6211 = 65.32 / 50 cc contain O_4 = 0.13359 gm = 0.66795
" " = .6277 = 66.01 / 50 cc " " = 0.13499 " = 0.67495

3.66 wt $Fe_2O_3 + Al_2O_3$ = .03482
3.32 Fe_2O_3 = .03163
.34 — Al_2O_3

3.44 % at CaO = 0.03279 grams

at MgP_2O_7 = .03329
1.26% at MgO = .01199

Av. oxygen. Wt air dry = 0.2008
Wt @ 110°-115°C. = .1909

Wt CO_2 = .1083
Wt O = .1969 = $\frac{1083 \times 1596}{87.78}$ = 10.31

Wt MnO_2 = .1069 = 55.99% MnO_2

Resume of 471.

SiO_2	1.70	per cent
Al_2O_3	0.34	" "
Fe_2O_3	3.32	" "
MnO	65.66	" "
MgO	1.26	" "
CaO	3.44	" "
BaO	5.65	" "
P_2O_5	none	" "
H_2O	2.78	" "
O available	10.31	" "
Co	traces	
Ni		
K_2O	0.35	
Na_2O	none	
	4.16	
	99.97	

Copy to R. book.

Penrose Manganese

Lab no 501 — Manganese Garnet. Kothmann Mine, Llano County Texas. Collector R.A.F. Penrose, Jr.

For analysis wt air dried = ~~1.0064~~ 0.5130 gram.

38.28% wt SiO_2 = .19642

Filtrate gives brown precip. in acid solution with H_2S; precip. soluble in conc. HNO_3, hot.

wt Fe_2O_3 + Al_2O_3 (chiefly former apparently) = .14049

wt $Mn_2P_2O_7$ = .05449 ∴ Mn = .02108

See page 180

Resumé — air dried mineral.

Silica (SiO_2) ——— 38.28 per cent.

Manganese (Mn) ——— 4.08(9) " "

or MnO ——— 5.28%

Lab no 502 Manganese ore — Spiller mine Texas. Collector R.A.F. Penrose

For analysis wt air dried = 1.000 gram.

wt Insol + wt SiO_2 = .16252 gram = 16.25%

Fused Ins + SiO_2 with Na_2CO_3 K_2CO_3 strong alkaline reaction wt SiO_2 =

Add filtrate & first filtrate (from nitrates) make up to 250 cc.

50 cc (1) wt $Mn_2P_2O_7$ =

50 cc (2) wt $Mn_2P_2O_7$ =

See page 176

See page 176

For available oxygen wt air dried = .2 gram

Labno 33 J. F. W. — Feb. 10, 1891

Monticellite (?) Rough quantitative analysis.

wt air dried about 0.6 gram.

wt SiO_2 = .1729 gram (28.81%) — 29%

(with alittle Mn) wt $Fe_2O_3 + Al_2O_3$ = .07222 — 12%

Fe_2O_3 = .04818 (7.53%) — 8%

4%

wt CaO = .21653 gram. — 36%

wt $Mg_2P_2O_7$ = .32792 gram.

MgO = .11816 (9.69%) — 20%

Resumé. —

SiO_2	29	percent
Fe_2O_3 (& Mn_2O_4 little)	7	"
Al_2O_3	5	"
CaO	36	percent
MgO	20	"
	"	

Total — 97 percent

R. N. Brackett

for J. Francis Williams

Feb 11 '91 —

Penrose Mn Ore

Lab. No 502 Mn Ore Spiller Mine, Texas.

(For analysis partial) wt air dried = 1.000 gram

wt Insolubles in conc HCl = 0.1625 16.25%

Fused Insols. with $\{Na_2CO_3 / K_2CO_3\}$ (long mn reaction, thro' have white bead prior prelim. with HCl on evapn — orange crystals as with 299.

wt SiO_2 = .09702 gram 9.70%

wt $Mn_2P_2O_7$ in Residue (Insols) = .10129 ∴ Mn = 3.92%

Filtrate from Insols. made up to 250 cc.

(1) 50 cc. wt $Mn_2P_2O_7$ = 0.26525 ∴ Mn = 51.31

(2) 50 cc. wt $Mn_2P_2O_7$ = 0.26109 gram ∴ Mn = 50.51)

R. wt $Mn_2P_2O_7$ = .10129 gram ∴ Mn = 3.92

(Total Mn = 55.23)

Filtrate from SiO_2 gave ppt. in acid solution — dark brown ppt — with H_2S — soluble in strong KNO3 hot — forming a yellow solution.

For available Oxygen.

I. wt. air dried = 0.2015 gram

wt CO_2 = 0.1236 gram = 11.15% O

II. wt air dried = 0.2304 gram

wt CO_2 = 0.1408 gram = 11.11% O

III. wt air dried = .2701 gram.

wt CO_2 = .1634 gram = 10.99%

Mean Available Oxygen = 11.08 per cent.

Rec'd March 12 '91

Resumé — air dried specimen

Silica (SiO_2)	9.70	per cent
Manganese (Mn)	55.23	" "
Available oxygen (O)	11.08	" "
	76.01	

(Mn (55.23%) equivalent to 79.35% Mn_2O_3; gives 8.04% Av. O.

" " " 87.40% MnO_2; gives 16.08% " "

Taking 3.90% Mn which is combined with SiO_2 here.

51.31% Mn equivalent to 73.72% Mn_2O_3; gives 7.47 Av. O

" " " " 81.19 MnO_2; " 14.94 " "

Williams J F

38. White material, Potash Sulphur. Collected by H. D Mitchell.

wt air dried = 0.5668 gram.

Loss B.B. 1.23% wt C + 38 bfht = 18.2794
" " aftht = 18.2724
wt loss B.B = 0.0070

Fusion with K_2CO_3 / Na_2CO_3 gave good manganese reaction.

wt SiO_2 = 0.30002 — 52.93%
2.26 wt $Fe_2O_3 + Al_2O_3$ = 0.01282 gram
wt Fe_2O_3 =
wt Al_2O_3 =

(Mn_3O_4) + wt CaO = 0.24789 and wt $Mg_2P_2O_7$ = .00699 ∴ MgO = .00252
wt $Mn_2P_2O_7$ from Ca = .00722 ∴ wt Mn = .00279 × 1.16 Mn_3O_4 = .00387

wt $Mn_2P_2O_7$ = .01642 wt Mn = wt MnO =

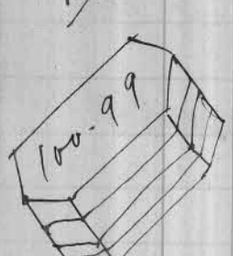
Recap wt CaO + Mn_3O_4 = 0.24789 — CaO = 43.05%
wt Mn_3O_4 = 0.00387 — MnO (total) = 2.08%
wt CaO = .24402 — MgO = 0.44%

wt MnO = .00360?

Resume of analysis of air dried specimen:

Silica (SiO_2)	52 93	per cent.
Alumina (Al_2O_3)	2 26	" "
Ferric oxide (Fe_2O_3)		" "
Lime (CaO)	43 05	" "
Manganese oxide (MnO)	2 08	" "
Magnesia (MgO)	0 44	" "
Loss by ignition	1 23	" "
Total	101 99	

Lime probably about 1% too high.



Probably Wollastonite.

and R R B
J. Francis Williams

William F. Francis

Lab No 39 - Pink material - Potash Sulphur - Collected by H. Dr. Mitchell.

wt air dried = 0.6768 gram.

Loss B.B. 2.74 per cent

Note: Pink powder turned almost white; on fusion with alkaline Na_2CO_3 gave better mix reaction than 38.

wt + 39 bef. ht.	= 18.3888
" " aft. ht.	= 18.3702
wt loss B.B.	0.0186

wt SiO_2 = 0.35172 gram. 51.96

1.880 lo — wt $Al_2O_3 + Fe_2O_3$ = 0.01273 gram.

wt Fe_2O_3 = _____

wt Al_2O_3 = _____

wt $Mn_2P_2O_7$ = .01272 ∴ MnO =

37.23% wt CaO = 0.25199 grm.; and wt $Mg_2P_2O_7$ = .01079 ∴ MgO =

(+ Mn_3O_4) wt $Mn_2P_2O_7$ from Ca = .00622 ∴ Mn_3O_4 =

and wt Mn_3O_4 from Ca = ∴ 1

wt CaO + Mn_3O_4 = 0.25199

wt Mn_3O_4 = 0.00334

wt CaO 0.24865

→ wt MnO =

CaO =	36.72%
MgO =	0.57
MnO (total) =	1.40

Resume of analyses of air dried specimen.

Silica (SiO_2)	51 96	per cent.
Alumina (Al_2O_3)	1 88	
Ferric oxide (Fe_2O_3)		
Lime (CaO)	36 72	
Manganous oxide (MnO)	1 40	
Magnesia (MgO)	0 57	
Loss by ignition	2 74	
Total	95 27	

95.27
5.31
5.58
10 0.58

For alk. wt air dried = 0.5313 gram.

wt KCl + NaCl = 0.0518 grm.

wt KCl = 0.0076

wt NaCl = 0.0442

wt H_2PtCl_6 = .0250 grm

0.903% K_2O = .0048

4.41% Na_2O = .0234

5.31

Williams & Francis

Lone 37 — Dyke ward Quarry — Collected by H. Williams.

wt air dried = 1.0012 grams.
wt + 37 after ht = 21.0663 grams
" " after ht = 21.0385 "
Loss B.B. = 0.0278 gram

Loss B.B. 2.776 %
regulus B.B.
37. clinkered stirred
to a snuff color

wt air dried = 1.0067 for analysis — fusion with K_2CO_3 / Na_2CO_3 — strong manganese reaction.

wt SiO_2 = 0.67682 gram = 67.60 %
after repeated wt SiO_2 = 0.63432 = 63.35 %

H_2S — precipitate in filtrate —

wt $Fe_2O_3 + Al_2O_3$ = 0.13012 gram.
wt Fe_2O_3 = 0.03543
wt Al_2O_3 = 0.13468

16.99
3.54
13.45

wt CaO = determined

wt $Mg_2P_2O_7$ = .02419 gram
~~wt MnO = 0.01473~~
~~wt Mn_2O_3 = .02946~~

wt $Mn_2P_2O_7$ = .0368 gram ∴ MnO = 1.82 % (?)

? MgO = ~~.016616 = 1.65 %~~
= .015924 = 1.58 %

Resumé of analysis of air dried specimen.

Silica (SiO_2)	63 35	per cent
Alumina (Al_2O_3)	13 45	" "
Ferric oxide (Fe_2O_3)	3 54	" "
Lime (CaO)		" "
Magnesia (MgO)		" "
Manganese oxide (MnO)		" "
Potash (K_2O)	0 43	" "
Soda (Na_2O)	4 26	" "
Loss by ignition	2.77	" "
Total		

For alkalies. wt air dried = 1.0070 gram

wt NaCl + KCl = .0878
wt KCl = .0070
wt NaCl = .0808

wt K_2PtCl_6 = .0230 gram.

0.43 % K_2O = .0044
= Na_2O = .0429

Penrose Manganese

Lab. no. 501 Manganese Garnet, Kothmann mine
Mason County, Texas. Collected by Penrose

Analysis. wt air dried = 0.8612 gram.

wt SiO_2 = 0.32072 gram. 37.24%

31.17% wt $Fe_2O_3 + Al_2O_3$ = .26849

wt $Mn_2P_2O_7$ = 0.31479 gram. MnO = 18.25 %

12.16 / 2.00 Mn_3O_4 / 10.16) wt CaO = 0.10479 wt $Mg_2P_2O_7$ =

Contains about 2% Mn_3O_4 = 1.86% MnO
(At least about .49 or .50 % lost of MnO)
Therefore at least 18.25
1.86
.49
Total MnO 20.60 %
.49
20.11

wt $Mg_2P_2O_7$ = .06369 MgO = .02295 = 2.66%

Resumé Partial analysis

Silica (SiO_2)	37.24 per cent	37.24	37.
(Fe_2O_3 Iron oxide	mechanically	31.17	15.
Alumina (Al_2O_3)	all iron.		9.
Manganese monoxide (MnO)	18.25	20.60	Trac
Lime (CaO)	10.16	10.16	und
Magnesia (MgO)	by difference	1.32	18.8
		100.00	12.8
			94.
			1.
			96.

R. B. Brackett
March 28/91.

Sp. gr. 3.57

Penrose - Manganese Ores.

Lab. No. 41, Montgomery mine - Section 31, 15 N., 8 W., Independence County, Arkansas.

Collector R. A. Penrose Jr.

For analysis wt (air dried) = 1.0011 gram.

wt SiO_2 = .37812 grms

with trace (Mn_3O_4) — Reqd - 17.5 ckd

wt Fe_2O_3 + Al_2O_3 = .2537 gram. 25.35%

Fe_2O_3 = .1550 2 15.48

Al_2O_3 ——— 9.87

wt $Mn_2P_2O_7$ = .3771 9 gram.

wt Mn = .14593 = 14.57 per cent.

As wt MnO = .18844 = 18.82 " "

As wt Mn_3O_4 = .20256 = 20.23 " "

For loss on ignition — 0.5998 gram. air dried.

wt C + 41 bf.ht = 18.8990

" + " af.ht = 18.8221

12.82% wt Loss B.B. = 0.0769

Resumé — analysis air dried specimen:

37.77	Silica (SiO_2) ———	37 77	per cent.
15.48	Ferric oxide (Fe_2O_3) ———		
9.87	Alumina (Al_2O_3) ———		
Trace	Lime (CaO) ———	undt.	
undt.	Magnesia (MgO) ———		
18.82	Manganese protoxide (MnO)	18.82	" "
12.82	Loss on ignition ———		
94.76	Total ———		
1.41	Mn_3O_4		
96.17			

Note: ~~Ni~~ Cobalt, nickel or copper,
Cobalt and copper none; nickel trace.

R. A. P. April 21/81

William J. Francis

Lab No 37. II analysis —

wt air dried = 0.5251 gram.

wt SiO_2 = 0.33922 gm. 64.60 per cent.

18.90% wt $Fe_2O_3 + Al_2O_3$ = 00.09929 gm.
3.11 wt Fe_2O_3 = 0.01631
15.79 wt Al_2O_3 = 0.08298

wt CaO = .00779 wt $Mg_2P_2O_7$ = ~~trace~~ 0.0049 MgO = ~~trace~~ .00378 = 7
1.48% for $Mg_2P_2O_7$ sup. 179

wt $Mn_2P_2O_7$ = .03079 MnO = .01538 2.92%

wt $Mn_2P_2O_7$ = .0104 MnO = .005274 = .99%
sum 1.00%

For alkalies wt air dried = 0.5696 gram

wt NaCl + KCl = 0.0598 gms. { K_2O = 00341 = 0.596
wt KCl = 0.0054 { Na_2O = .02886 = 506
wt NaCl = 0.0544
wt K_2PtCl_6 = 0.0177

Returned Analysis — air dried material:

Silica (SiO_2)	64.	60	per cent.
Alumina (Al_2O_3)	15.	79	" "
Ferric oxide (Fe_2O_3)	3	14	" "
Lime (CaO)	1	48	" "
Magnesia (MgO)	1.	58	
Potash (K_2O)	0.	59	" "
Soda (Na_2O)	5.	06	" "
Loss by ignition =	2.	77	" "
Manganous oxide (MnO)	3	92	
	98	90	
	1	00	
	97	32	

MnO

Omit

Sent to Washington May 1891

Penrose

Lab no 501 (1) Manganese garnet Texas, Kothmann Mine Penrose R.A.F. Jr.

Specific gravity.

at air dried ore = 2.3920 grams.
at ore dried with cloth after immersion = 2.4140 "
Absorption = .0220 "

at wire + ore immersed = 1.9325 grams
at wire (alone) " = 0.1885 "
at immersed ore = 1.7440 "

at immersed ore = 1.7440 grams.
Absorption = 0.0220
at ind ore – absorption = 1.7220

at air dried ore = 2.3920
at ind ore – absorption = 1.7220
Loss of ft in water 0.6700

.67) 2.39200 (3.57 Sp. Gr.
201
382
335
470
469

RNB
April 3'91.

Penrose Manganite Sp. gr.

at dried after immersion = 2.1485 grams
at air dried = 1.1091
Absorption = 1.0394

at wire + ore immersed = 1.7300
at wire alone " = 0.1885
at ore immersed = 1.5415

at ore immersed = 1.5415
Absorption = 1.0394
At ore ind – absorption = .5021

at air dried ore = 1.1091
= .5021
Loss in water = .6070

.607) 1.1091 (1.8
607
5027

Error somewhere.

By bottle mtt made Sp. Gr. 3.76

Pennsylvania Manganese ores.

Lab. no. 503 – Manganese ore Southern mine, nw. ¼ se. ¼ of section 24, 14 N., 7 W. Independence county, Ark.

For analysis (see below) wt air dried = 1.0018 grms.
" " dried @ 110°-115°C = .9938 "

For water, loss B.B. [~~and Alkalies~~] wt air dried = 1.0068
" " dried @ 110°-115°C = 0.9987

wt C + SO3 bflt. = 19.3915
" + " aflt. = 19.3834
0.80% water at 110°-115°C = 0.0081
wt C + SO3 bflt B.B. = 19.3834
" + " aflt B.B. = 19.3250
5.84% wt loss B.B. = 0.0584

For alkalies – wt air dried = 1.0021 grms.
wt " @ 110°-115°C. = 0.9941 "
Na_2O = .003767 wt Na Cl (not K Cl) = 0.0071 grm.
= 0.37%

For analysis –
wt air dried = 1.0018
wt " @ 110°-115°C = 0.9938

wt $Fe_2O_3 + Al_2O_3$ = .01593 = 1.60
wt Fe_2O_3 = .01079 = 1.02
4
wt Al_2O_3 = 0.58
wt $Mn_2P_2O_7$ = wt MnO = wt Mn =
wt CaO = trace. wt $Mg_2P_2O_7$ = trace. MgO =
~~wt $Mn_2P_2O_7$ =~~
wt SiO_2 = 0.00422 0.42%

For P_2O_5 (see above) wt air dried = 1.0068 grm.
wt " @ 110°-115°C = 0.9987
wt $Mg_2P_2O_7$ = .0079 ∴ P_2O_5 = .00498 = 0.498% P_2O_5

For available oxygen – I. wt air dried = .2870
Av. Oxygen = .02645 = 9.28 " " @ 110°-115°C = .2848
II. " air dried = .2053
Av. Oxygen = .01843 = 9.05 " " @ 110°-115°C. = .2037
2) 18.33
9.17

wt $BaSO_4$ = .03909 ∴ BaO = .02567 = 2.58 per cent.
~~wt $Mn_2P_2O_7$ (with Mg) =~~
(Faint trace Co –

Sp. gr. 4.48 for details of Spec. see p. 115

(Resumé see p. 187

Clay — Hackett City.

Lab. no. 43 — White to gray clay — Label: From McKenna's quarry, near Hackett City — From D. McKenna Ft Smith

For ~~analysis~~, water, loss RB — wt air dried = 1.0025 grms.
wt dr. @ 110°-115°C = 0.9542 "

4.81(7) % — wt water @ 110°-115°C = 0.0483 grms.
8.54 % — wt loss RB. = 0.0815 "

For alkalies — wt air dried = 2.0227 grms.
wt dr @ 110°-115°C. = 1.9255
wt NaCl + KCl = 0.0898
K_2O = .00954 = 0.49 % — wt KCl = 0.0151
Na_2O = .0396 = 2.01 % — wt NaCl = 0.0747
wt K_2PtCl_6 = .0495

33.84 % — wt $Fe_2O_3 + Al_2O_3$ = 0.34499 grm. — Reqd 4 cc. $KMnO_4$
3.15 — wt Fe_2O_3 = 0.03261
30.69 — wt Al_2O_3 =

0.63 % — wt CaO = .00652 — wt $Mg_2P_2O_7$ = 0.02689 ∴ MgO = 0.00969 = 0.94 %
54.12(6) — wt SiO_2 = 0.55772 grms.

For analysis — wt air dried = 1.0826 grams.
Trace Mn — wt dr @ 110°-115°C = 1.0304 "

Resumé — Analysis — material d. @ 110°-115°C

Silica (SiO_2)	54.13	per cent.
Alumina (Al_2O_3)	30.69	" "
Ferric oxide (Fe_2O_3)	3.15	" "
Lime (CaO)	0.63	" "
Magnesia (MgO)	0.94	" "
Manganese	trace	" "
Potash (K_2O)	0.49	" "
Soda (Na_2O)	2.01	" "
Loss by ignition	8.34	" "
Total =	100.58	
water @ 110°-115°C.	4.82 %	

R. N. B. April 14 1891
12 m. Noon.

Clay — Ft Smith

Lab. no. 45. Dark gray clay. Label. Indian Territory line 4 miles south of Ft Smith, at Hartshorn coal mine

4 ft thick. Doyle.

For analysis, water, loss BB

wt air dried = 1.0144 grms.
wt dry @ 110°-115°C = 1.0066 "
wt C + 44 bfht. = 21.0602 grms.
" + " afht. = 21.0524 "
0.76 % wt water @ 110°-115°C = 0.0078 "
wt C + 44 bfht BB = 21.0524 "
" + " afht BB = 21.0025 "
4.95(7) % wt loss BB = 0.0499 "

For alkalies

wt air dried = 2.0753 grms.
wt dry @ 110°-115°C = 2.0596
wt NaCl + KCl = 0.0754 grms.
K_2O = .00524 = 0.25 % wt KCl = 0.0083 "
Na_2O = .0356 = 1.72 % wt NaCl = 0.0671
wt K_2PtCl_6 = .0272

Reqd. 4.5 cc KMnO4

21.13 wt $Fe_2O_3 + Al_2O_3$ = 0.21279 grms.
3.64 wt Fe_2O_3 = 0.03669
17.49 wt Al_2O_3 = 0.17610

wt CaO = none.

$Mg_2P_2O_7$ = .02552 ; MgO = .009196 = 0.91 %

70.83 % wt SiO_2 = 0.71302

Fe =
Mn =
P = 0
For

Resume analysis:

Silica (SiO_2)	70.83	per cent.
Alumina (Al_2O_3)	17.49	" "
Ferric oxide (Fe_2O_3)	3.64	
Lime (CaO)	none	" "
Magnesia (MgO)	0.91	" "
Potash (K_2O)	0.25	
Soda (Na_2O)	1.72	
Loss by ignition	4.95	" "
	99.79	

water @ 110°-115°C., 0.76 per cent.

R. B. April 14, 1891

S.S. $KMnO_4$ April 13, 91.—

wt Fe piano wire = 0.6978 gram.
Corr^d " " " " = 0.6964 "

Dissolved in HCl and made up to 250 cc.

I 25 cc req^d — 0.6 cc — 12.5 cc $KMnO_4$ = 11.9 cc $KMnO_4$
II 25 cc req^d — 12.5 — 24.7 " = 12.2 "
III 25 cc " — 24.7 — 36.9 " 12.2 "

So taking II & III:

25 cc. req^d 12.2 cc $KMnO_4$
250 cc " 122 cc. "
∴ 12.2 cc $KMnO_4$ = .06964 grm. Fe
122 cc. " = 0.6964 grm. Fe
1 cc. " = 0.005708 grms. Fe

Lab no 503 Resume' of Analysis:

Material dried @ 110°–150°C.:

Silica (SiO_2)	0	22 per cent.
Alumina (Al_2O_3)	0	58
Ferric oxide (Fe_2O_3)	1	02
Manganese protoxide (MnO)	80	91.
Lime (CaO)	trace.	
Magnesia (MgO)	trace.	
Phosphoric acid (P_2O_5)	0	49 "
Soda (Na_2O)	0	37 "
Loss on ignition	3	84 "
Available oxygen	9	17
Baryta (BaO)	2	58 " "
	99	38

Fe = .704
Mn = 62.66 %
P = 0.21

Made Mn up to 250 cc.:

I 25 cc gave $Mn_2P_2O_7$ = .27509 (N.B. subtract $Mn_2P_2O_7$ of 504
II 25 cc. $Mn_2P_2O_7$ =

Omit Omit — Omit

For Mn. analysis wt air dried = 0.2012
" " @110°–111°C = 0.1996

wt $Mn_2P_2O_7$ = .32339 gram
wt MnO = .1615 gram. = 80.91 %.

Penrose —

Lab no. 504 Manganese Garnet (3) (2) Kothmann mine
Mason county Texas. Yellow.

For water and loss B.B. (talk)

wt air dried =
" 2 @ 110°-115°C. =
wt water @ 110°-115°C =
wt loss B.B

For analysis wt air dried = 1.0247
wt 2 @ 110°-115°C =

No. 4 % wt SiO_2 = 0.37139 grams.

27.14 % wt $Al_2O_3 + Fe_2O_3$ = .27819
15.91 " Fe_2O_3 = .16308
1.23 Al_2O_3

$MnSO_4$ + wt CaO = .06189
$MnSO_4$ = .03095
CaO = .02094

wt $Mn_2P_2O_7$ = .04140

2.00 %

wt $Mg_2P_2O_7$ + $Mn_2P_2O_7$ = .09499
" $Mn_2P_2O_7$ = .03166
$Mg_2P_2O_7$ .06333

MgO = .02282
MnO = .01225

2.22 %

MnO = .02229
MnO = 2.80

MnO = 26.39

MnO = .20946 = 20.44

MnO = 1.53 %

Resumé of Analysis: of air dried material:

Silica (SiO_2)	36 24	per cent.	
Alumina (Al_2O_3)	11 23	"	"
Ferric oxide (Fe_2O_3)	15 91	"	"
Lime (CaO)	2 04	"	"
Magnesia (MgO)	2 22	"	"
Manganese protoxide (MnO)	30 09		
	94 78		
	97 73		

Sp. gr. Sub. by fractionation

2.80
2.17
.63

MnO = 1.53
2.17
20.44
24.14
5.95
30.09
.63
30.72

Sp. gr. 3.72

26.39
20.44
5.95

Sept. 192

Resumé sep. 192

Dr. Branner J.C.
when dried light drab color.

Lab no. 505 Clay Label: April 16'91 D.H. Womack's clay pit. w. side of market sq. Benton Saline Co.

Collector D.H. Womack.

For water and loss B.B. wt air dried = 1.0021
wt dry @ 110°-115°C = 0.9292

7.27% wt water @ 110°-115°C. = 0.0729
7.38 " wt loss B.B = 0.0686

No manganese. Burns pinkish white, but does not sinter.

For analysis wt air dried = 1.0326 grams.
wt dried @ 110°-115°C = 0.9576

66.23% wt SiO_2 = 0.63479 gram.

24.43% wt Fe_2O_3 + Al_2O_3 = .23402
2.42 wt Fe_2O_3 = .02038
22.31

0.92% wt CaO = 0.00882 wt $Mg_2P_2O_7$ = MgO =

For alk. wt air dried = 1.0126 grams
wt dried @ 100-115°C = 0.9390 "

K_2O = .00038 = .04% wt NaCl + KCl = .0289
Na_2O = .01502 = 1.59% wt KCl = .0006
wt NaCl = .0283

K_2PtCl_6 = .0020 gram.

Resumed analysis:

		per cent
Silica (SiO_2)	66.23	" "
alumina (Al_2O_3)	22.31	" "
Ferric oxide (Fe_2O_3)	2.12	" "
Lime (CaO)	0.92	" "
Magnesia (MgO)	trace.	" "
Potash (K_2O)	0.04	" "
Soda (Na_2O)	1.59	" "
Loss on ignition	7.38	" "
	100.59	100.59

water @ 110°-115°C — 7.27 per cent

R.B. April 27'91.

Penrose - Manganese Ores.

Lab. no. 506 - Manganese ore - Crimora mine Virginia - Collected R.A.F. Penrose Jr.

For water & loss B.B. & P_2O_5] wt air dried = 1.0025
wt dry @ 110° - 115°C. = .9907

1.19% wt water @ 110° - 115°C. = 0.0118 gram.
11.59% wt loss B.B. = 0.1149 gram.

wt $Mg_2P_2O_7$ = .01002 P_2O_5 = .00641 = 0.64% 2/3 of this P_2O_5 =

For alkalies & Ba wt air dried = 1.0000
wt dry @ 110° - 115°C. = 0.9883

K_2O = .0024 = 0.24%
Na_2O = .0138 = 1.39%

wt KCl + NaCl = 0.0298 gram.
wt KCl = 0.0038
wt NaCl = 0.0260

wt K_2PtCl_6 = .0124

For analysis - & Ba wt air dried = 1.0009
wt dry @ 110° - 115°C. = 0.9992

(bf. fusion) wt SiO_2 = 0.22142 gram.
wt Fe_2O_3 + Al_2O_3 = .08772
wt Fe_2O_3 = .01631

8.77
1.63
7.14

wt Mn_3O_4 = .00892 MnO = .00829 = 0.82%
wt CaO = Trace wt $Mg_2P_2O_7$ = trace MgO =
wt $Mn_2P_2O_7$ = .33852 = MnO = .13097 = 13.10% = MnO 16.91
$BaSO_4$ = .04857 gram. BaO = .03189 = 3.19%

(after fusion) wt SiO_2 = 0.15832 = 15.84%.
100°C (from 500°C) wt $Mn_2P_2O_7$ = .16339 × 5 = 0.81695 - MnO = .40815 = 40.84

Resume analysis:

	Silica (SiO_2)	15.84	per cent.
Fe = 1.14	Alumina (Al_2O_3)	7.14	" "
Rn B	Ferric oxide (Fe_2O_3)	1.63	" "
	Lime (CaO)	trace	" "
Mg 2.91	Baryta (BaO)	3.19	" "
	Magnesia (MgO)	trace	" "
	Potash (K_2O)	0.24	" "
	Soda (Na_2O)	1.39	" "
	Cobalt oxide	none (more characteristic minerals)	" "
	Nickel oxide		
P = 1.8	Trace of sulphur (S)	9.85	
	phosphoric acid (P_2O_5)	0.48	" "
Mn = 45.36	Manganous protoxide (MnO)	58.57	" "
	Loss on ignition		Loss ig. = 2.78
	Total		

J. C. B — (Clayo) Iron ores.

Label 509 - (507) — Iron ore — outside black Alth. tollie next red — net yellow red sandy — mixed for analysis. —

Label: "Letter of Alt. Series April 18, 91 — April 20/91 — Northern part of Lafayette County, Ark. From Iron Alt. Series, New Lewisville, Lafayette County, Ark." —

— For Silica, Iron Phosphorus. —

For Silica and Iron — Of air dried — 1.0000

Wt SiO_2 = (Insolubles) = 0.01329 gram. 1.33%

Make filtrate up to 250 c.c.

Wt Fe = .02626 in 10 c.c. (1)

" " = .02512 in 10 c.c. (2)

.02569 mean Wt total Fe = 0.64225 = 64.23%

For Phosphorus — Of air dried — 1.0005

Wt $Mg_2P_2O_7$ = .00452

Wt P_2O_5 =

Wt P = .00126

Resume

Silica (SiO_2) (Insolubles)	1 33	per cent
Iron (Fe)	64 23	" "
Phosphorus (P)	0 12	" "

Probably a Limonite — Hydro hematite.

R. A. B. April 22/91.

J. C.

506. Av. Oxygen.

Wt. Oxygen = .02027 = 9.73

Wt. Oxygen = .02147 = 9.96

2) 19.69

9.85

I Of air dried = .2107

" @ 100°-111°C = .2083

II Of air dried = .2154

" " @ 110-111°C = .2129

Perrozc

Lab no. 504. Marquette. Kathmana mine Perry.

Sept. 188

Resumé				
SiO_2	36	24	per cent	
Al_2O_3	11	23	"	"
Fe_2O_3	15	91	"	"
CaO	2	04	"	"
MgO	2	22	"	"
MnO	30	72	"	"
alkalies by difference	1	64	"	"
	100	00		

Sp. gr. 3.72 R.N.B Apl 21 '91

J.C.B. Clays

Lab no. 508 – Clay rep. apl '91. Label not given
receiving not fractional ¼ Cleburne Co.
Collector J.B. Jeeter.

For water, loss B.B., Alk

at air dried = 1.0075 grams.
" " @ 100–115°C = 0.9738 "

3.34 % at water @ 100–115°C = 0.0337
7.71 % at loss B.B. = 0.07751

K_2O = .00284 = 0.29 | wt NaCl + KCl = .0240
Na_2O = .02095 = 2.15 | at KCl = .00495
at Na_2Cl_2 = .0148 | at NaCl = .0395

Mar

For analysis

at air dried = 1.0026 grams.
" @ 100–115°C = 0.9711 "

64.82 % at SiO_2 = .62952 grams.

23.45 % at $Fe_2O_3 + Al_2O_3$ = .22779 grams.
3.94 at Fe_2O_3 = .03833
19.51

1.27 % at CaO = .01237 at $Mg_2P_2O_7$ = .01662
MgO = .00599 = 0.61 %

508. When wet is black - stains the hands. Probably graphitic, as black matter readily burns off.

For soluble matter. — at air dried = 2.0009 wt @ 110°-115°C = ———

Boiled with water (distilled) — and residue washed with hot water solution made up to 250 cc.

50 cc. Contained 50g = = $BaSO_4$ =

50 cc. Contained Cl =

Material @ 110°-115°C. Rescue' analysis — 508.

Silica (SiO_2)	64.	82	per cent
Alumina (Al_2O_3)	19	51	" "
Ferric oxide (Fe_2O_3)	3	94	" "
Lime (CaO)	1	27	" "
Magnesia (MgO)	0	61	" "
Potash (K_2O)	0	29	" "
Soda (Na_2O)	2	15	" "
Loss on ignition	7	71	" "
	100	30	

Water @ 110°-115°C. — 3.34 per cent.

R.N.B April 30th 91

Graphitic clay —

Penrose —

Lab. No. 509 — Rhodonite, Sonora California.
Collected R. A. F. Penrose Jr.

For analysis . wt air dried = 0.3598 gram.

wt SiO_2 = .15842 gram. 44.03 per cent

4.23 wt Fe_2O_3 + Al_2O_3 = .01522
wt Fe_2O_3 =

wt CaO = .01032 = 2.87% wt $Mg_2P_2O_7$ = trace
wt Mn_3O_4 = .00516 ∴ MnO = .004798 = 1.33 per cent.

wt $Mn_2P_2O_7$ = .32107 = Mn = .12422 = 34.52
MnO = 44.57

Rhodonite ($MnSiO_3$) — impure

Rivers Mon 4

(97)

Resume' analysis of air dried material:

Silica (SiO_2)	44.03	per cent.
Alumina (Al_2O_3)	(not more than trace)	
Ferric oxide (Fe_2O_3)	4.23	per cent
Lime (CaO)	2.87	" "
Magnesia (MgO)	trace	" "
*Manganese protoxide (MnO)	44.57	" "
	95.70	
MnO	1.33	(Mn$_3$O$_4$)
Total	97.03	+ 0.53 = 97.56

*@ 1/2 of 1 per cent

Sp. gr. not taken — not wanted

Rhodonite —

4 4.5 3 3 3 MnO
1. 5 3
4 6.4

Lab. no. 510 – Clay. Label: 'Imported Fuller's clay, pulverized.'
From John Olsen.

For water; loss B.B.; ~~alk~~

	wt air-dried	= 1.0013
	wt dry @ 110°–115°C.	= 0.8757
12.54 %	% water @ 110°–115°C.	= 0.1256
7.98 %	% loss B.B.	= 0.0699

Burns light reddish-brown and sinters together fusing on edges.

For alk.

wt air-dried	= 1.0016 grams.	
" dry @ 110°–115°C.	= 0.8760	
wt KCl + NaCl = .0113		
wt KCl = none		
K₂O = none =	wt NaCl =	wt Na_2SO_4 = None
Na_2O = =		

For analysis

wt air dried	= 1.0052 grams.
wt dry @ 110°–115°C	= .8792 "

wt SiO_2 = 0.5360 gr = 60.96 per cent.

24.38 %	wt Fe_2O_3 + Al_2O_3 = .21443	3.32 %	wt CaO = .02919
7.96	wt Fe_2O_3 = .07013		wt $Mg_2P_2O_7$ = .09059
16.42		3.71 %	= MgO = .03265

Resumé of analysis of material dried @ 110°–115°C.:

Silica (SiO_2)	60.96	per cent.
Alumina (Al_2O_3)	16.42	" "
Ferric oxide (Fe_2O_3)	7.96	" "
Lime (CaO)	3.02	" "
Magnesia (MgO)	3.71	" "
Potash (K_2O)	none.	" "
Soda (Na_2O)	0.67	" "
Loss on ignition	7.98	" "
	100.72	
Water @ 110°–115°C.	12.54	per cent.

Clay – Fuller's

Lab. no. 511. Clay. Label: Ground Fuller's clay. Sec. of sec. 8, 15, 1 W., near Alexander. Collected John Olsen.

For water; loss RB; alk. wt air dried = 1.0166 grams.
at 2 @ 110°–115°C. = 0.9459 "

6.95 % wt water @ 110°–115°C. = .0707 gram.
7.55(8) % wt loss (on ignition) RB = .0715 "
Note: as in 512.

wt KCl + NaCl = .0414
K_2O = .09919 = 1.04 % | wt KCl = .0157
Na_2O = .01363 = 1.44 | wt NaCl = .0257
wt K_2PtCl_6 =

For analysis wt air dried = 1.0348 grams.
at 2 @ 110°–115°C = 0.9629 "

62.92 % wt SiO_2 = .60592

25.86 %
7.62
18.24 wt Fe_2O_3 + Al_2O_3 = 0.24909 gram.
wt Fe_2O_3 = 0.07339

(1.26 % wt CaO = .01219)
(Footnote – not over 0.76 %)

wt $Mg_2P_2O_7$ = .04749
MgO = .01711 = 1.77 %

Resumé – material dried @ 110°–115°C.:

Silica (SiO_2)	62 92	per cent
Alumina (Al_2O_3)	18. 24	" "
Ferric oxide (Fe_2O_3)	7 62	" "
Lime (CaO)	0 76	" "
Magnesia (MgO)	1 77	" "
* Potash (K_2O)	1 04	" "
* Soda (Na_2O)	1 44	" "
Loss on ignition	7. 55(8)	" "
	101 34	

Water @ 110°–115°C. 6. 95 per cent

* Alkalies probably too high.

Fuller's Clay.

Lab. No. 512. Clay. Label: "Raw Fuller's clay. near Alexander s.w. of se. of section 8, 15, 13W. Collector John Olsen."

For water, loss B.B.; acl. wt air dried = 1.00485 grams
wt dr @ 110°-115°C. = 0.9257 "

7.84 % wt water @ 110°-115°C. = 0.0788 grams
7.57 % wt loss B.B. = 0.0701 "

Note: Burns dark - rather grayish black; sinters together only slightly - no fusion.

wt KCl + NaCl = 0.0293
K_2O = .00196 = 0.21 } wt KCl = 0.0031
Na_2O = .01390 = 1.50 % } wt NaCl = 0.0262
wt K_2PtCl_6 = .0100

For analysis wt air dried = 1.0047 grams
wt dr @ 110°-115°C. = 0.9260 "

64.60 % wt SiO_2 = 0.59822
63.19 % after fusion SiO_2 = .58522

24.73 % wt $Fe_2O_3 + Al_2O_3$ = .22909 } .01002 = 1.08 %
6.43 wt Fe_2O_3 = .05953 } .00571 = .62
18.30 0.46

0.78 wt CaO = .00729 wt $Mg_2P_2O_7$ = .04339
MgO = .01564 = 1.61 %

Resumé - material dried @ 110°-115°C.:

Silica (SiO_2)	63 19	per cent
Alumina (Al_2O_3)	18 76	" "
Ferric oxide (Fe_2O_3)	7 05	" "
Lime (CaO)	0 78	" "
Magnesia (MgO)	1 68	" "
Potash (K_2O)	0 21	" "
Soda (Na_2O)	1 50	" "
Loss on ignition	7 57	" "
	100 74	" "
Water @ 110°-115°C.	7. 84	per cent

Penrose Manganese Ores.

Lab No. 513. Mn Ore. Label: "Notebook 109½ page 95
April 23, '91 N.W. of section 24, 1N., 14W. Boq Fe and Mn

Collector R.A.F. Penrose Jr. "Smelter Location"
For analysis wt air dried = 1.0027 gram.
11.38% wt Fe = 0.1142 req'd for 50 cc (500 cc) 2 cc. KMnO4
60.87% wt SiO_2 = .61042
wt $Mn_2P_2O_7$ = .20179 wt Mn = .07807 = 7.78%

For P_2O_5 — wt air dried = 1.0006 gram.
wt $Mg_2P_2O_7$ ~~.00179~~ .00922 P = .00258 = 0.25%
d @ 100°C = .9639

For Moisture — @ 100°C wt air dried = 1.0067
3.67% wt moisture = .0370
wt d. @ 100°C = .9765

For Loss B.B. wt air dried = 1.0137
Total loss B.B. = 0.1110 = 10.94
@ 100°C 3.67
7.27

Resume' analysis air-dried material:

Manganese (Mn)	7 78	per cent.
Iron (Fe)	11 38	" "
Phosphorus (P)	0 25	" "
* Silica (SiO_2) insoluble material	60 87	" "
Moisture	3 67	" "
Loss on ignition	7 27	

Quick reaction for Co, not examined for Ni.
R.K.P.B. April 28/91

RK

* Insoluble in Conc HCl.

Analysis of material dried @ 100°C —

Mn	8 08	per cent
Fe	11. 82	
SiO_2 + insol.	63 19	
P	0 27	
Loss ignit.	7 515	
	7	
Moisture	3 67	

Lab No 514. Mn ore. Label. Notebook log 1/2 page 89. April 23, '91
W. Branch N.E. of Sec. 14 - 1N - 14W. Collector RAFR Jr.

~~For analysis~~ at air dried = 1.0026 grams.
" δ @ 100°C = 0.9760
44.86% wt SiO_2 = .4498 gram.

26.19% wt Fe = 0.2626 Mg ppt for P_2O_7 (500°C) 4.6 cubic cm
wt mm P_2O_7 = .04059 wt Mn = .0157 = 1.56%

For P_2O_5 - at air dried = 1.0002 grams.
" δ @ 100°C = .9676
wt $Mg_2P_2O_7$ = .01652 wt P = .00462 = 0.46%

For moisture @ 100°C at air dried = 1.0134 grams.
" δ @ 100°C = 0.9803
3.26% wt moisture = .0331 gram.
8.66% wt loss B.B = .0878 "

Resumé analysis air dried material.

Manganese (Mn)	1 56	per cent
Iron (Fe)	26 19	" "
Phosphorus (P)	0 46	" "
Silica (SiO_2) insol. material	44 86	" "
Moisture	3 26	" "
Loss by ignition	8 66	" "

Fair reaction for Co. not examined for it.
R. N. B. April 29/91 OK

analysis of material dried @ 100° C.

Mn	1 62	per cent
Fe	27 07	" "
P	0 47	" "
SiO_2 + insol	46 37	" "
Loss ignition	8 95	" "
Moisture	3 26	" "

Pen Mn ores

Lot No 515. Mn ore. Label: Notebook dog ½ p. 11. April 23'91
NW of NW of section 24 – 18N – 14W. C R & M Co

Collector R. A. F. B. Jr.

For analysis – at 3 @ 100°C = 0.9883
at air dried = 1.0025 grams.

42.22% wt SiO_2 = .42332 — req'd for 50 cc (250 cc) 1 cc $KMnO_4$
wt $Mn_2P_2O_7$ = .69849 — wt Fe = ~~0.011708~~ .0285 = 2.84%
wt Mn = .27025 = 26.95%

For P_2O_5 — wt 3 @ 100°C = 1.9741
wt air dried = 2.0025 grams
wt $Mg_2P_2O_7$ = .00832 — wt P = .002325 = 0.12 or .116%

For Moisture @ 100°C — wt 2 @ 100°C = .9904
wt air dried = 1.0047
wt Moisture = 0.0143 grams = 1.42%
wt Loss B.B. = 0.0871 " = 8.66%
wt air dried = 2.0002 grams.
For Co & Ni — wt 2 @ 100°C =

Resumé

Manganese (Mn)	26	95	per cent
Iron (Fe)	2	84	" "
Phosphorus (P)	0	11(6)	" "
Silica (SiO_2) orinol. matter	42	22	" "
Moisture	1	42	" "
Loss in ignition	8	66	" "

Strong reaction for Cobalt. Not much for nickel
R. N. B. April 29'91

Analysis of material dried @ 100°C.:

Mn	27	34
~~Fe~~	2	88
P	0	11
SiO_2 orinol.	42	83
Loss in ignition	8	79
Moisture	1	42

Penn Mn ore.

Lab no. 516. Red clay?. Label. "Notebook 109½, p. 96
April 23, '91. N.E. 24-1N.-14W. Catholic Ridge?

For analysis wt air dried = 2.0023 grams
" d @ 100°C = 1.9418
wt SiO_2 = .87222 = 43.56%

32.78% = wt Fe = .6564
Req for 10 cc (.5000g) 11.5 cc KMnO4

wt $Mn_2P_2O_7$ = .01969

wt Mn = .00762 = .38%

For P_2O_5 —

wt air dried = 2.0040 grams.
" d @ 100°C = 1.9435

wt $Mg_2P_2O_7$ = .01112

wt P = .00763
.00311 = .15%

For moisture @ 100°C. —

wt air dried = 1.0020
" d @ 100°C = 0.9717

wt moisture = .0303 = 3.02%
wt loss B.B. = .0857 = 8.55%

Resume —

Manganese (Mn)	0.38	per cent
Iron (Fe)	32.78	" "
Phosphorus (P)	0.15	" "
Silica (SiO_2) & insol. mat.	43.56	" "
Moisture	3.02	" "
Loss on ignition	8.55	" "

R.A.B. April 29'91

Analysis of material dried @ 100°C:

Mn	0.39	per cent.
Fe	33.80	" "
P	0.16	
SiO_2 insol.	44.91	
Loss ignite	8.81	
Moisture	3.02	