

ITEM I - ANALYTICAL METHODS

SUMMARY REPORT

This item is apparently taken from the files of Geleenberg Benzin, Inc., covering the period from late 1938 to about January, 1940.

Sub-items 1, 2, 4 through 39 and 44 deal with the analyses common to the production of steel. Included are methods for the analysis of various types of finished steels and pig iron, of slag (Bessemer ?) obtained from the production of steel, of refractory material used for the linings of steel melting furnaces, materials used in the production of slag, of coal for the production of coke, and, of coke used in the production of steel. They have all been classified as having "no value" to the petroleum industry and there is considerable question in the reviewers' minds if anything would be gained by passing this film on to steel manufacturing interests.

Sub-items 40, 41, and 42 deal with analysis of plant and waste waters by more or less obvious means. Sub-item 45 through 64a, 77, 85, 89, 91, 103, and 104 deal with analysis of coke oven gases and their treating solutions. The remainder deal with analysis of light oil fractions (benzine, or gasoline) from coal distillation. A number of these have been abstracted, particularly those dealing with the analysis of materials having compositions similar to petroleum material, if a published source of the material could not be readily identified.

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3	Rapid Analysis of Bronze, Brass, etc. (no value)	3
4	Refractories (no value)	3
5	Slag (no value)	1
6	Calcium + Magnesium (no value)	1-1/2
7	Phosphorus and Phosphorus pentoxide (no value)	1/2
8	Sulfur in Slag (no value)	1/2
9	Iron and Ferric oxide in slag (no value)	1/2
10	Ferrous oxide in slag (no value)	1/2
11	Aluminum oxide in slag (no value)	1/2
12	Calcium oxide in slag (no value)	1
13	Ash analysis (no value)	8
14	Seger cones (no value)	2
15	Spot plate and spot acid (no value)	3
16	Indirect analysis (no value)	1
17	Arsenic in sulfuric acid (no value)	1
18	Manganese in dolomite (no value)	1/2
19	Sulfur (Eschka) (no value)	1/2
20	Phosphorus (no value)	1

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21	Iron in Slag (no value)	1/2
22	Phosphorus in iron (no value)	1/2
23	Phosphorus in iron ore, steel, etc. (no value)	1
24	Phosphorus and Silicon oxide in iron and steel (no value)	1/2
25	Iron and manganese (no value)	1/2
26	Si (10% + in iron) (no value)	1/2
27	Nitrogen (no value)	1/2
28	Silicon in iron (no value)	1
29	Copper in Steel (no value)	1/2
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31	Arsenic in Steel (no value)	1
32	Nickel in Steel (no value)	1
33	Silicon in iron and steel (no value)	1
34	Arsenic in Iron (no value)	1
35	Sulfur in iron and steel (no value)	1
36	Sulfur (no value)	1
37	Phosphorus in Iron (no value)	2
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39	Phosphorus (no value)	2
40	Hardness of water (no value)	1
41	Ammonia in phenolic water (no value)	1/2
42	Hydrogen sulfide in water (no value)	1/2
43	Sodium sulfite (no value)	1
44	Carbon in iron and steel (no value)	2
45	C ₂ , O ₃ , O ₄ in strippers (1941) (abstracted)	5
46	Caustic in phenol solutions (abstracted)	4
47	Specific gravity of coal (no value)	2
48	Gas analysis, by combustion, absorption, (considerable material missing - no value)	4
49	Removal of Nitric oxide from coke gas (Brennstoffchemie No. 16, 1939) (published)	8
50	Detection of water in gaseous fuel (abstracted)	3
51	Sulfur dioxide in gases (published)	1
52	Sulfur in oil (tetraoxy quinone indicator) (published)	1
52a	SO ₂ and H ₂ S in Claus-oven exit gas (no value)	1
53	Analysis of "Alkazid" solutions (abstracted)	2
54	Ammonia with Parnas Wagner apparatus (no value)	2
55	Carbon dioxide in Stripper water (no value)	2
56	Analysis of purge gas (no value)	3
57	Alkali in phenol solutions (same as 46)	4
58	Potash caustic solution (no value)	2
59	Ammonia in gas (no value)	3
60	Propane recovery (no value)	3
60a	Preparation of chromous chloride (no value)	(3 copies) 1
61	Removal of corrosive nitrogen oxide from flue gases (published)	(4 copies) 1
62	Iron in Alkazid solution (abstracted)	
63	Hydrocyanic acid (published)	1
64	Arsenic in Alkazid solution (abstracted)	
64a	Determination of hydrogen cyanide (no value)	
65	C ₃ and C ₄ in gasoline (abstracted)	3

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66	O ₃ , O ₄ and O ₅ in gasoline (abstracted)	4
67	Review of Publications (1937) of analytical methods (2 copies) of solid, liquid and gaseous fuels (published)	6
68	Memo concerning tank car samples (abstracted)	5
69	Description of "Sarmiza" process for production of high octane fuel (non-catalytic) (abstracted)	2
70	Petrographic investigation of insoluble coal residue (published)	1
71	Amino acid (published)	1
72	Liquid vapor equilibrium at high pressure and temperature (published)	1
73	Electrolytic reduction of aliphatic nitro groups (no value)	1
74	Thiocyanate and cyanide analysis (published)	2
74a	Bromometric determination of thiocyanate (published)	1
75	Potentiometric titration of non-aqueous solutions (published)	1
76	Sulfur dioxide in gases (published)	1
77	Removal of ammonia from gases (published)	1
77a	Preparation of fluor-sulfonic acid (published)	1/2
77b	Fluorine derivatives of propane (published)	1/2
77c	Reaction of aliphatic olefins with thiophene (published)	2
78	Cracking of paraffins in the presence of aluminum chloride (published)	1
79	Treatment of cracked gasoline with heavy metal salts of naphthenic acid (published)	1/2
80	A new absorbent for removal and recovery of CS ₂ from industrial liquids and gases (published)	1/2
80a	Polymerization of ethylene with aluminum compounds as catalyst (published)	1/2
80b	Synthesis of glycerides by means of trityl compounds (published)	2
81	Laboratory precision fractionating columns (Foster Wheeler) (published)	1
82	Oxidation of nitrogen oxide to dioxide (translated)	1
83	Ammonia determination in gases with 0.01 N H ₂ SO ₄ (no value)	1
84	Preparation of pure steam (published)	1
85	Viscosity of hydrocarbons (published)	1
86	Phenol removal from oils (published)	1
87	Oxygen in water (no value)	1
88	Oxygen in gas (no value)	1
89	Organic sulfur in gases with Grote-Krekeler apparatus (published)	4
90	Preparation of non-foaming 50% potassium hydroxide (translated)	1
91	Hydrocyanic acid (same as 63)	2
92	Nessler reagent (no value)	8
93	Abstract of Patents and Journal article (published)	3
94	Nitrogen compounds from petroleum distillates (published)	1
95	Preparation of special solutions (no value)	3
96	Carbonic acid in copper hydroxide solution used for CO purification (no value)	1

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97	Electrolytic reduction of aliphatic nitro groups (same as 73)	1
98	Preparation of strychnine - molybdc acid (published)	1
99	Potentiometric titration of non-aqueous solutions (published)	1
100	Thiocyanates (published)	2
101	Sulfur in oil with tetraoxyquinone indicator (published)	1
102	Olefins and aromatics in oils (published)	1
103	Removal of ammonia from gas (published)	1
104	Sulfur dioxide from gas (published)	1
105	Sensitivity of reactions with phenol (published)	2
106	Methods for hydrogen manufacture process by steam (3 copies) cracking methane (no value)	4

ABSTRACTED AND TRANSLATED SUB-ITEMS45) Procedure for the Determination of Liquefiable Gases (C₂, C₃, C₄ without C₅ Fraction) in Strippers and Benzine. (Abstract)

This method describes the separation of C₄ and lighter (no C₅ present) hydrocarbons as a single fraction from stripper liquids and gasoline. The separation is made in a large vacuum jacketed column having a metal spiral wire packing. The dephlegmator consists of a bulb condenser maintained at a constant temperature of -15°C. The distillation is reputed to be rapid but the apparatus seems far below current U.S. design quality.

46) Calculation of Alkali Content in Phenol Extractor and Similar Materials. (Abstract)

The method assumes that the extract contains free NaOH, Na₂S, and sodium salts of phenol mixtures (30% phenols and 70% cresols). The total alkali is determined by titration with 1 N acid, the Na₂S by precipitation with acidified cadmium acetate and the phenols sprung with acid and measured. Alternatively the total alkali is determined by a double titration (with indicators not described) to obtain the Na₂S content by difference. The ratio of phenol to cresols is determined from the density of the sprung phenols. Caustic is determined by difference.

50) Description and Manipulation of Apparatus for the Detection of Water in Liquefied Gases. (Abstract)

Liquefied sample is transferred to a transparent Dewar flask and inspected for turbidity or large separated ice crystals. Results are qualitative as only the appearance of the liquid is reported.

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53) Analysis of "Alkazid" Solutions. (Abstract)

Describes the analysis of saturated and regenerated "alkazid" solution (apparently an alkaline-solution for the removal of H_2S from gases). In the former the specific gravity and total gas (CO_2 plus H_2S) are determined. In the latter the specific gravity, total gas, H_2S (alone) and thiosulfate are determined. All determinations are made according to common practices.

62) Determination of Dissolved Iron in Alkazid Solution. (Abstract)

Describes a procedure for the gravimetric determination of iron (as $Fe(OH)_3$). If SiO_2 or aluminum present, iron is determined colorimetrically as thiocyanate.

64) Directions for Determination of Arsenic in "Alkazid" Solution. (Abstract)

Arsenic is removed from an acidified solution with H_2S . The sulfide is oxidized to arsenate with $KClO_3$ and in ammonical solution is precipitated as magnesium arsenate with magnesia-mixture. The precipitate is ignited to $Mg_2As_2O_7$ and weighed.

65) C_3 and C_4 Determination in Benzine (Gasoline). (Abstract)

All the C_3 and C_4 is removed from the gasoline by distilling over the first 25% in an ASTM apparatus catching the overhead in a cold trap. The distillate is distilled through a vacuum jacketed column packed with small aluminum spirals. The dephlegmator bulb condenser is held at $-35^\circ C$ until no more C_3 is collected. By slowly warming to $-8^\circ C$, an isobutane rich fraction is obtained, to $-3^\circ C$ a butylene rich fraction is obtained; the remaining C_4 is taken over at $+3^\circ C$. The analysis is reputed to be rapid.

66) C_3 , C_4 and C_5 in Gases. (Abstract)

This is an extension of the procedure described in No. 65 differing principally in that the amounts of different components collected in the traps are recorded together with the temperature of the dephlegmator head which is allowed to increase slowly

68) Memo Concerning Tank Gas Shipment Samples. (Abstract)

This is a certified report of properties of tank car shipment of gas oil from Teerver-waltung D-Heiderich to Gelsenberg as determined by a referee laboratory.

69) Description of "Sarmalza" Process for Production of High Octane Fuel (Non-Catalytic). (Abstract)

This is a brief abstract of a lecture given by one H. Weiss describing the Rumanian "Sarmalza" process for the production of aromatic rich aviation fuels. Paraffin and gas oils are vaporized ($300^\circ C$),

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cracked (500°C) polymerized at higher temperatures (600°C) and dehydrogenated (720°C) all being accomplished without pressure or catalyst. Some data on properties of finished product given. No details or references given.

82) Oxidation of NO to NO₂. (Translation)

"With kieselgur alone or after impregnation with NiO, CoO, MnO₂ according to Burdick (JAOS 44, 244 (1922)) gives only a slight increase in the oxidation velocity. Silica gel is capable of increasing the oxidation of NO considerably. The velocity constant on the surface of the silica gel is about 20 times greater than in the gas phase. With decreasing bulk density in general the catalytic activity of the silica gel increases. But since the total surface of the gel decreases per volume unit with decreasing bulk density the use of highly voluminous silica gel is not advisable."

90) Preparation of Non-foaming 50% KOH for Microazotometer. (Translation)

"Some pulverized activated charcoal (T-Kohle) is triturated with water to a thin paste until all the charcoal is well wetted. Suspension is drawn through a glass filter funnel of medium porosity (with vacuum) until a layer of 1 cm. is formed. The filtrate should be absolutely clear; otherwise wash the mat with water until a clear filtrate is obtained. After the charcoal has been dried as much as possible with suction, the hot 50% KOH is filtered under continuous suction. The filtrate is clear and does not foam."