INVESTIGATION OF A BITUMEN FROM PARK COUNTY, MONTANA.*

BY WM. C. DAY and A. P. BRYANT.

Although asphalt and allied materials are known to occur at many localities in the United States, comparatively little has been accomplished in the way of their analysis and investigation. Results thus far secured have been confined chiefly to a few sources favorably situated for transportation at low rates. The available supply of asphalt at present largely exceeds the demands. Since, however, the uses to which this material may be applied are increasing, and since, further, no one source yields a product suitable for all purposes we have thought it worth while to place on record the facts and figures secured in connection with a material from a new source in the West.

The substance under consideration was taken from the property of Mr. C. J. Lakin, of Miles City, Montana.

The sample consisted of about one liter of a brownish-black material, liquid enough to flow very slowly at ordinary temperatures, and possessed of an unpleasant and quite pronounced odor.

ANALYSIS.

Determination of Water.

0.4647 grams of bitumen gave 0.0314 grams of water absorbed in a chloride of calcium tube after two hours heating in a U tube immersed in boiling water; a current of dry air was passed through the tube during this time.

Percentage of water found, 6.76.

There was no evidence whatever of any change in the material other than the loss of water.

Determinations of Carbon and Hydrogen.

No. 1.—0.6462 grams of substance gave 1.8672 grams of carbon dioxide and .5365 grams of water.

* Read at the stated meeting of the Chemical Section, held June 19, 1894.

No. 2.—0·4097 grams of substance gave 1·2144 grams of carbon dioxide and ·3449 grams of water.

Carbon found, No. 1, 78·80, No. 2, 80·81.

Hydrogen found, No. 1, 9·22, No. 2, 9·35.

Determination of Mineral Matter.

No. 1.—0·8426 grams of substance gave on combustion 0·0058 grams of residue.

No. 2.—0·3324 grams of substance gave on combustion 0·0023 grams of residue.

Percentage of ash, No. 1, 0·69 per cent.

Percentage of ash, No. 2, 0·69 per cent.

Determination of Sulphur.

0·7144 grams of substance gave (using Liebig's method) 0·1471 grams of barium sulphate.

Percentage of sulphur found, 2·83.

A determination of nitrogen gave only a trace.

The following analysis of commercial interest was also made:

MATERIAL SOLUBLE IN CARBON DISULPHIDE.

5·5300 grams of dry substance gave 5·2540 grams of material (bitumen) soluble in carbon disulphide.

Percentage of bitumen found, 95·00.

The weight of the material insoluble in carbon bisulphide was 0·2760.

Percentage of foreign organic matter, 4·99.

The material soluble in carbon disulphide was treated with gasoline, and the percentage of matter soluble in gasoline (petrolene) was thus determined.

5·5300 grams of the original substance gave 4·4240 grams of material soluble in gasoline.

Percentage of petrolene found, 80·00.

The foreign organic matter found consists largely of fragments of birds' feathers, leaves and insects, which had probably accidentally been caught and submerged in the pitch.

The following distillation experiments were made:

Seventy-four grams of the substance were introduced into a distilling flask by aid of a filter pump; the viscosity

of the material was such that it took several hours to transfer about 100 cubic centimeters to the flask.

A Bunsen flame was applied directly to the flask; the material frothed considerably, giving a gas which was collected and measured. The gas given off at this stage amounted to 2,250 cubic centimeters. When a thermometer placed with the bulb in the vapor (*i. e.*, a little below the side tube of the distilling flask) showed 98° C. the frothing ceased and a liquid distilled over between 98° and 110°; the weight of this fraction was 6.75 grams. The second fraction was taken between the limits 110° and 170°, its weight was 2.3 grams; the third fraction was taken between 170° and 225°; its weight was 8.75 grams; the last fraction was from 225° to the limit of the thermometer; it weighed 22.5 grams. The last fraction was accompanied by the more rapid evolution of gas which had decreased at 98°. Between 98° and 225°, 1,000 cubic centimeters of gas were produced.

The amount of gas evolved at this final stage was 2,500 cubic centimeters, thus making in all 5,750 cubic centimeters of what, on burning, proved to be a good illuminating gas.

A number of tests for aromatic hydrocarbons and derivatives yielded negative results.

The following summary of the analytical results obtained shows how the material in question compares in chemical constitution with Trinidad asphalt, which has heretofore supplied a large percentage of the demand in the United States:

	<i>Trinidad.*</i>	<i>Park Co., Montana.</i>
Water,	—	6.76
Carbon,	85.89	79.81
Hydrogen,	11.06	9.29
Oxygen,	.56	.62†
Nitrogen,	—	trace.
Sulphur,	2.49	2.83
Ash,	—	0.69
	<hr/> 100.00	<hr/> 100.00

* Analyst, Bowen.

† By difference.

These figures are only approximately comparable, since those for the Trinidad material are calculated on the pure

and dry asphalt, exclusive of earthy and foreign organic matter.

A comparative investigation of gilsonites and asphalts from a number of new sources in the United States is now being carried out by the authors, and the present paper may be regarded as preliminary to a more comprehensive one, which, it is hoped, may be presented in the fall.

SWARTHMORE COLLEGE,

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ANTHRACITE.COAL NEAR PERKIOMEN CREEK.*

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A vein of coal twenty-six inches thick has been discovered on the Shirley farm at Arcola Station, on the Perkiomen Railroad, about twenty-five miles from Philadelphia. The vein is located near where the Skippack Creek empties into the Perkiomen Creek. An expert miner has been working on the vein for the past three weeks, and pronounces the coal of fine quality. A company is being formed for the purpose of working the coal. There are a number of smaller veins in the immediate vicinity, and it is thought that coal can be mined in large quantities on this and the adjoining farms. Several mining experts from Pottsville were at Arcola and examined the outcroppings of coal, and pronounced the indications the very best, and before leaving made a liberal offer for the farm. Work has been temporarily suspended on account of the water flowing in from the creek.

The above notes of January 6, 1894, are from local newspapers. A visit to the locality showed me that the coal seam is found at the base of a high hill, which slopes steeply to the Skippack Creek, near where it empties into

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