

The above mentioned resin bodies are presumably those to which Parr and Kressmann¹ refer when they speak of the avidity of freshly mined coals for oxygen, which gas enters into combination with the unsaturated hydrocarbons of the coal.

Fischer² made use of the oxidizability of these resins as an indication of the liability of a coal to heat. He heated a weighed sample with a definite quantity of an oxidizing agent like bromine water.

Stansfield³ draws attention to the similarity between the production of acids by oxidation of aldehydes, and the production of acids (humic) by oxidation of coal.

3. *Humus bodies* are similar in chemical composition to woody fibre, they retain a considerable amount of water which is only removed at 105°C; they have a lower percentage of carbon than shown in the table (p. 5) as Harger's figures are calculated free of nitrogen, ash and water. Large quantities occur in peat and lignites, lesser quantities in cannel and bituminous coals, and none in true anthracite.

Boudouard⁴ worked on these bodies, and shows that the chemical constituents of the humic substances obtained by extraction from coal by means of potassium hydroxide solution, correspond with one or more of the following formulae:—

1. $C_{18}H_{14}O_6$ (Berthelot and Andre)
2. $C_{18}H_{14}O_9$ (Malaguti)
3. $C_{18}H_{14}O_{11}$

and that the effect of oxidizing the coal is to diminish the percentage of carbon, and increase the hydrogen and oxygen content of the humic substances.

Treatment with potassium hydroxide, hydrochloric acid and Schweizer's reagent completely destroyed the coking power of a coal, probably because the cellulose-like substances were removed.

Boudouard also points out that the humic acids are probably the carbohydrates of the original coal in a condensed and polymerized condition, just as polyatomic alcohols, sugars, etc. furnish resins by treatment with alkalis, acids, or by heat.

Chemically similar humic substances, artificially prepared, resemble those extracted from peat and lignite, which adds credence to the theory of the formation of coal aforementioned.

4. *Hydrocarbons* chiefly methane, occur in large quantities in some coals, ethane and higher paraffins may also occur; but these constituents need not be further discussed here.

¹ University of Illinois Exp. Sta. Bull. 46 (1910).

² Die Brennstoffe Deutschlands, etc. Braunschweig, 1901, pp. 1-107.

³ Jour. Can. Mining Inst. Vol. XIII, 1910, p. 126; and Coals of Canada, Vol. VI, 1912, pp. 95-120.

⁴ Bull. de la Société Chimique, Ser. 4, Vol. V, 1909, pp. 365, 372, 377, 380.

Compte Rend. 147, p. 986; 148 p. 284 and 348—1909.