PART V

MINERAL FUELS

CHAPTER XXII

COAL AND ITS CLASSIFICATION [1]

FUELS are materials which give off sufficient heat when burnt to be of use in an ordinary fireplace, furnace, or burner. The burning of a fuel is the combination of one or more of its constituents with the oxygen of the air. Most bodies give off heat when combining with oxygen, but they are only regarded as fuel if they can be used extensively as a source of heat.

The important mineral fuels are coal, mineral oil, and peat. Other minerals serve as fuel under special conditions; pyrites is used in pyritic smelting, when both its constituents, iron and sulphur, give off heat; and oil is distilled from oil-shale. The chief fuels belong to the carbonaceous series, and depend on carbon or compounds of carbon with hydrogen. Coal is the fuel of supreme importance in the modern world. Wood and oil are its only serious rivals. Ordinary wood (e.g. ash, oak, and elm) has a calorific value of only 5420 British Thermal Units (B.T.U.) [2] while coal varies from

[1] For coal in general, cf. E. S. Moore, *Coal*, 1922.

[2] A B.T.U. is the heat required to raise the temperature of a pound of water 1° F. (usually taken from 60° to 61° F.). A calorie is the heat required to raise a gram of water 1° C., usually taken from 14° to 15° C. To convert B.T.U. to calories multiply by $\frac{5}{9}$. Calorific value is determined by combustion in a calorimeter; but it can be estimated from the analysis by various formulæ such as that of Dulong. This formula, adapted to later determinations of the fuel values, is $8100\ C + 24{,}500\ (H - \frac{1}{8}O) + 2250 \times \frac{5}{9}$, in which C, H, O and S are the weights of the carbon, hydrogen, oxygen, and S. Hence of a good bituminous coal with e.g. sulphur 1 per cent., hydrogen 5 per cent., carbon 74 per cent., and oxygen 7 per cent., the calorific value would be 13,468 B.T.U.