

easily distinguished by its color, however, from the deep orange antimonial sulphide. The crystalline character, etc., of this sublimate, would also effectually prevent any chance of misconception.

12. THE COAL ASSAY.

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In the practical examination of Coals, the following operations are essentially necessary:—(1) The estimation of the water or hygro-

* To these might be added, the determination of the heating powers or "absolute warmth" of the coal, but this may always be estimated with sufficient exactness for practical purposes by the amount of coke, ash, and moisture, as compared with other coals. Properly considered, the litharge test, resorted to for the determination of the calorific power of coals, is of very little actual value. The respective results furnished by good wood charcoal and ordinary coke, for example, are closely alike, if not in favour of the charcoal; and yet experience abundantly proves the stronger heating powers of the coke. In practice, moreover, the actual value of a coal does not always depend upon the "absolute warmth" of the latter, as certain coals, such as brown coals rich in bitumen, may possess heating powers of considerable amount (as estimated by the reduction of litharge) though only of brief duration. Thus, the lignites of the department of the Basses Alpes in south-eastern France, and those of Cuba, yield with litharge from 25 to 26 parts of reduced lead; whilst many caking coals, practically of much higher heating power, yield scarcely a larger amount. When pyrites also is present in the coal—a condition of very common occurrence—the litharge test becomes again unsatisfactory, the pyrites exerting a reducing action on the lead compound.

As described, however, by BAUNO KEAL, in quoting the writer's Coal Assay (*Löthrohr-Untersuchungen*: Zweite Aufl. 1862, p. 146) the so-called absolute warmth or heating power of a coal sample may be determined, if desired, in blowpipe practice, by the following modification of BEATTIE'S method:—20 milligrammes of the coal, in fine powder, are to be mixed intimately with 500 milligrammes of oxy-chloride of lead (consisting of 3 parts of litharge + 1 part of chloride of lead, fused together and finely pulverized). The mixture is to be placed in a blowpipe-crucible, and covered with about an equal amount of the lead compound, a second cover of 8 blowpipe-spoonfuls of powdered glass + 1 spoonful of borax, being spread over this. The crucible, covered with a clay capsule, is then to be fitted into a charcoal block in the ordinary blowpipe furnace, over which a charcoal lid is placed, and the flame directed against its under side, so as to keep it at a red heat for from 5 to 8 minutes. The weight of the reduced lead divided by 20 gives the amount of the lead mixture reduced