

To these might be added, the determination of the heating powers of the coal ; but this operation, at all times one of more or less uncertainty, cannot be performed by the blowpipe in a satisfactory manner. This, however, is really of little consequence, as apart from the doubtful character of the experiment even when conducted on the large scale, the relative heating powers of different samples of coal may generally be estimated sufficiently near for practical purposes by a comparison of the amount of coke, ash, and moisture. The litharge test commonly resorted to for the determination of the calorific power of coals, when properly considered, is of very little actual value. Take, for example, the respective results furnished by good wood-charcoal and ordinary coke. These results are closely alike or rather in favour of the charcoal ; and yet experience abundantly proves the stronger heating powers of the coke. It is impossible to raise the temperature of a furnace with charcoal to anything like the same degree as that obtainable by the employment of coke. Besides which, in practice, it is not as a general rule, the absolute calorific powers of a coal that constitute its availability for ordinary operations, because a coal—such, for instance, as a brown coal rich in bitumen—may possess heating powers of considerable amount, but only of short duration : and in cases of this kind, the litharge test becomes again unsatisfactory. Thus the lignites of the department of the Basse Alpes, already alluded to, yield with litharge from 25 to 26 of lead ; whilst many caking coals, practically of much higher heating powers, yield scarcely a greater amount. For these reasons, whilst seeking to discover a satisfactory method of ascertaining directly by the blowpipe the heating power of coals, I leave the subject out of consideration in the present paper.

*Estimation of Moisture* :—This operation is one of extreme simplicity. Some slight care, however, is required, to prevent other volatile matters from being driven off during the expulsion of the hygrometric moisture. Seven or eight small particles, weighing together from 100 to 150 milligrammes, are to be detached from the assay-specimen by means of the cutting pliers, and carefully weighed. They are then to be transferred to a porcelain capsule with thick bottom, and strongly heated for four or five minutes on the support attached to the blowpipe lamp : the unaided flame of the lamp being alone employed for this purpose. It is advisable to place in the capsule at the same time, a small strip of filtering or white blotting paper, the charring of which will give indications of the temperature becoming too high. The coal, whilst still warm, is then to be transferred to the little brass