

ducing part further up and nearer the centre. The amount of sodium present in the mineral is indicated by the extent to which the flame is colored yellow. The potassium is similarly estimated, but the flame is then looked at with cobalt glass, so as to eliminate the influence of the sodium.<sup>49</sup>

*Blow-pipe Tests.*—The chemical tests with the blow-pipe are simple, easily applied, and require only patience and practice to give great assistance in the determination of minerals. If unacquainted with blow-pipe analysis, the student must refer to one or other of the numerous text-books on the subject, some of which are mentioned below.<sup>50</sup> For early practice the following apparatus will be found sufficient:

1. Blow-pipe.
2. Thick-wicked candle, or a tin box filled with the material of Child's night-lights, and furnished with a piece of Freyberg wick in a metallic support.
3. Platinum-tipped forceps.
4. A few pieces of platinum wire in lengths of three or four inches.
5. A few pieces of platinum foil.
6. Some pieces of charcoal.
7. A number of closed and open tubes of hard glass.
8. Three small stoppered bottles containing sodium-carbonate, borax, and microcosmic salt.
9. Magnet.

This list can be increased as experience is gained. The whole apparatus may easily be packed into a box which will go into the corner of a portmanteau.

### iii. *Chemical Synthesis*

As already remarked (p. 118), much interesting light has been thrown on the natural conditions in which minerals

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<sup>49</sup> Szabo, "Ueber eine neue Methode die Felspathe auch in Gesteinen zu bestimmen." Buda-Pesth, 1876.

<sup>50</sup> The great work on the blow-pipe is Plattner's, of which an English translation has been published. Elderhorst's "Manual of Qualitative Blow-pipe Analysis and Determinative Mineralogy," by H. B. Nason and C. F. Chandler (Philadelphia: N. S. Porter and Coates), is a smaller but useful volume; while still less pretending is Scheerer's "Introduction to the Use of the Mouth Blow-pipe," of which a third edition by H. F. Blandford was published in 1875 by F. Norgate. An admirable work of reference will be found in Prof. Brush's "Manual of Determinative Mineralogy" (New York: J. Wiley and Son). F. v. Kobell's "Tafeln zur Bestimmung der Mineralien" (Munich) are useful. A valuable summary will be found in Prof. Cole's "Aids in Practical Geology," 1891.