CHAPTER THREE

# MASONRY

*Syllabus.*—Formation and classification of stones ; characteristics, tests. Quarrying, mining and machine dressing. Stone dressings to door and window openings. Cornices. Stone steps and stairs.

Formation and Classification of Stones.—As stated on p. 33, Vol. I, rocks are divided into three principal classes, *i.e.*, (1) igneous, (2) sedimentary and (3) metamorphic. These are considered in greater detail in this chapter.

Geology, which is the science concerned with the composition, structure and history of the materials of the earth, is briefly referred to here as an introduction to a study of the rocks used for building purposes.

The basic rocks of the earth's crust were formed from material molten by intense heat at the interior of the earth. Some of this material, such as granite (see next column), was consolidated at a great depth below the surface, whilst molten paste erupted from volcanoes solidified on the earth's surface to form rocks, such as, for example, those contained in the mountains of the Lake District, North Wales and the Scottish Highlands. Other rocks were formed from fragments of minerals disintegrated from the originally formed rocks by natural agencies, such as the expansive action of frost and the expansion and contraction due to alternate heat and cold, and removed by streams to form successive layers of sand, gravel, etc. ; the pressure on the lower layers squeezed out the water and interlocked the grains, and, in addition, water charged with substances such as carbonate of lime and silica acted as cementing agents and hardened the mass of such sedimentary rocks during percolation ; examples of rocks formed in this manner are sandstones and limestones (see pp. 88-94). Marbles (see p. 96) and slates (see p. 132, Vol. I) are examples of another class of rock formed from basic or sedimentary rocks which have been metamorphosed (altered) in structure as a result of lateral (side) pressure or heat or both. Yet another class of rocks is formed from the remains of marine organisms, and certain limestones (see p. 94), consisting of shells, corals, etc., are examples of these.

*A classification of the known rocks of the earth's crust is given in Table IV on p. 87.*

1. *Igneous Rocks.*—These have been formed of material which has been molten by the intense heat within the interior of the earth and become solidified. They are divided into (*a*) *plutonic* rocks, (*b*) *hypabyssal* rocks and (*c*) *volcanic* rocks.

(a) *Plutonic Rocks* are igneous rocks which have been consolidated at a considerable depth below the earth's surface ; the erosion (wearing away) of the upper and softer strata has caused such rocks to appear at the earth's surface. Consolidation was gradual owing to the extremely slow rate of cooling, and such rocks are therefore completely crystalline and have a coarse-grained texture.

These rocks consist of silica in combination with bases such as iron, lime, magnesia, potash and soda, and they are classed as *acid*, *intermediate* or *basic*, according to the percentage of silica content. Thus, acid rocks have over 66 per cent. of silica, intermediate rocks have from 52 to 66 per cent. of silica, and the silica content of the basic group is less than 52 per cent.

The (i) *granites* are included in the acid group of plutonic rocks, the (ii) *syenites* and (iii) *diorites* are of the intermediate group, and the (iv) *gabbro* family forms the basic group. These are described below.

Constituent Minerals of Igneous Rocks.—These include quartz, felspar, mica, hornblende, augite, diallage, magnetite and pyrites.

*Quartz* is pure silica. The grains are hard and *extremely durable* ; they are commonly colourless, although those of granite especially may vary in colour from pink, yellow, purple, red and brown to black.

*Felspar* is the group of minerals which is usually the most abundant. The grains are silicates of alumina combined with one or more of the bases—lime, potash and soda. Potash felspar is known as *orthoclase* ; soda felspar or *albite* and soda-lime felspar or *oligoclase* are called *plagioclase* felspars. The colour of the plagioclases is usually white or light grey, and that of orthoclase crystals may be yellowish-pink, red or green.

*Mica.*—These crystals are silicates of alumina with potash or magnesia. The potash micas are silver white and have a bright lustre ; one of the most important of these is known as *muscovite*. The magnesian micas are dark brown or black, and the principal of these is called *biotite*. Mica appears as short, glittering scales or flakes parallel to the natural bed ; these flakes are therefore an indication of the position of the natural bed. The white mica is very durable, but the biotite variety is softer and liable to decomposition.

*Hornblende* is of the *amphibole* group and is a silicate of magnesia, lime, aluminium and iron. The colour is green, brown or black.

*Augite* is a modification of hornblende, it being similar in composition and colour but differing somewhat in the shape of the crystals.

*Diallage* is a variety of augite, green in colour, and when seen under the microscope the crystals are usually laminated.

*Magnetite*, or magnetic ore, has a bluish-black metallic lustre ; it influences the colour of stones.

*Pyrites* is another iron ore. It occurs as small yellow specks. Crystals of the " white iron pyrites " variety, called *marcasite*, readily decompose, as the pale yellow changes to white efflorescence and the sulphuric acid formed in the process sets up decay in the stone.

(a) (i) *Granite.*—There are several kinds of this crystalline granular rock and these vary in colour and texture. The chief constituents are felspar, quartz and mica, the former being predominant ; hornblende and augite are sometimes represented in addition to or in place of mica. If the mica present is the white