

of the same mass of rock should be found to vary considerably from place to place.¹⁵

The most elaborate and successful experiments yet made regarding the fusion of igneous rocks, are those of MM. Fouqué and Michel-Lévy. These observers, by mixing the chemical elements and, in other cases, the mineralogical constituents, of certain minerals and rocks, and fusing these in platinum crucibles in a gas-furnace, have been able to produce both rock-forming minerals, such as several feldspars, augite, leucite, nepheline, and garnet, and also rocks possessing the composition and microscopic structure of augite-andesites, leucite-tephrites, and true-basalts. By rapid cooling, they obtained an isotropic glass, often full of bubbles, and varying in color with the nature of the mixture from which it was formed. Where the mixture contains the elements of pyroxene, enstatite, or melilite, it must be cooled very rapidly to prevent these minerals from partially crystallizing out of the glass. Nepheline also crystallizes easily. The feldspars, on the other hand, pass much more slowly from the viscous to the crystalline condition. In these experiments, use was made of the law that the fusion-temperature of a crystallized silicate is usually higher than that of the same substance in the glassy state. Hence if such a glass be kept sufficiently long at a temperature slightly higher than that at which it softens, the most favorable con-

¹⁵ Bull. Soc. Geol. France, 2d ser. iv. 1382; see also Trans. Edin. Roy. Soc. xxix. p. 492. In the more recent experiments by Doelter and Hussak no change was observed in the porcelain crucibles in which basalt, andesite and phonolite were melted. Neues Jahrb. 1884, p. 19. Bischof has described a series of experiments on the fusion of lavas with different proportions of clay-slate. He found that the lava of Niedermendig, kept an hour in a bellows furnace, was reduced to a black glassy substance without pores, and that a similar product was obtained even after 30 per cent of clay-slate had been added and the whole had been kept for two hours in the furnace. "Chem. und Phys. Geol." supp. (1871), p. 98.