

acid gas). He found, too, that magnesia, caustic potash, and caustic soda, would combine with the same air, with similar results. This discovery consisted, of course, in a new interpretation of observed changes. Alkalies appeared to be made caustic by contact with quicklime: at first Black imagined that they underwent this change by acquiring igneous matter from the quicklime; but when he perceived that the lime gained, not lost, in magnitude as it became mild, he rightly supposed that the alkalies were rendered caustic by imparting their air to the lime. This discovery was announced in Black's inaugural dissertation, pronounced in 1755, on the occasion of his taking his degree of Doctor in the University of Edinburgh.

The chemistry of airs was pursued by other experimenters. The Honorable Henry Cavendish, about 1765, invented an apparatus, in which aërial fluids are confined by water, so that they can be managed and examined. This hydro-pneumatic apparatus, or as it is sometimes called, *the pneumatic trough*, from that time was one of the most indispensable parts of the chemist's apparatus. Cavendish,³ in 1766, showed the identity of the properties of fixed air derived from various sources; and pointed out the peculiar qualities of *inflammable air* (afterwards called hydrogen gas), which, being nine times lighter than common air, soon attracted general notice by its employment for raising balloons. The promise of discovery which this subject now offered, attracted the confident and busy mind of Priestley, whose *Experiments and Observations on different kinds of Air* appeared in 1744-79. In these volumes, he describes an extraordinary number of trials of various kinds; the results of which were, the discovery of new kinds of air, namely, *phlogisticated air* (azotic gas), *nitrous air* (nitrous gas), and *dephlogisticated air* (oxygen gas).

But the discovery of new substances, though valuable in supplying chemistry with materials, was not so important as discoveries respecting their modes of composition. Among such discoveries, that of Cavendish, published in the *Philosophical Transactions* for 1784, and disclosing the composition of water by the union of two gases, oxygen and hydrogen, must be considered as holding a most distinguished place. He states,⁴ that his "experiments were made principally with a view to find out the cause of the diminution which common air is well known to suffer, by all the various ways in which it is phlogisticated." And, after describing various unsuccessful attempts, he finds

³ *Phil. Trans.* 1766.

Phil. Trans. 1784, p. 119.