porating to dryness sea water containing carbonates, the latter are in great part decomposed by the chloride of magnesium, which is so large and important a constituent of sea salt, and the solution of which acts in this respect like an acid. Mr. Buchanan evaporated the samples of sea water in a platinum basin in the water-bath, therefore the tendency to decomposition would be less than if it had been directly boiled down. In many waters thus experimented on, carbonates were found, in others they were not. It is therefore exceedingly desirable that experiments should be made on freshly drawn samples of the deep water of the ocean. The experiments of Professor Dittmar were all made on samples which had been preserved for six or seven years in glass bottles, and those of the Norwegians on samples similarly preserved for various lengths of time up to two years. Their results, though correct in themselves, and of value as corroborative evidence, do not replace investigations on the freshly collected water which was used for the extraction of the gases and the carbonic acid on board.

Table VIII. gives the results of the analyses of some of the samples of gas extracted from waters of various depths. It will convey a more definite idea of the nature of the gaseous contents of the waters than can be obtained from a general description. In the part devoted to surface waters the pressure of dry air is given in the column otherwise devoted to "Depth," and the observed volumes of nitrogen and oxygen are reduced to their value, supposing the dry air pressure to have been 760 millimetres.

Bottom Waters.—Of the three samples from the Antarctic Ocean, only two (Nos. 383 and 395) belong really to it, the third (No. 414) is rather from the colder temperate zone, and resembles much more a water from the South Pacific or South Atlantic. In the first two, from the neighbourhood of the Antarctic Circle, the volume of total gas is large, 29 to 30 c.c., of which about 23 per cent. is carbonic acid. In most of their properties the two waters agree well with each other, but there is an exception in the amount of carbonic acid given off during distillation with chloride of barium; in the case of No. 383 it is 42·2 c.c. and in that of No. 395 only 29·32 c.c.; the volumes of carbonic acid extracted by boiling *in vacuo* are 6·59 c.c. in the case of No. 383 and 7·03 c.c. in that of No. 395. The oxygen percentages are high in all three waters, agreeing in this respect with the Arctic waters examined by the Norwegian chemists. The absolute amount of oxygen is 5·75 c.c. and 6·71 c.c.; when compared with the amount which would be present along with the nitrogen observed, there is a deficiency of 2·92 c.c. and 1·73 c.c. Subtracting these amounts from the volume of carbonic acid extracted by boiling *in vacuo*, there remain 3·67 c.c. and 5·33 c.c., which would not be excessive in a surface water.

The amount of nitrogen present in both of these waters is very high, 16·57 and 16·07 c.c. From an atmosphere of dry air of 760 millimetres pressure these volumes would be absorbed at temperatures of 2°·3 and −1°·2 C. respectively. Although the absolute volumes of the gases must not be considered as quite accurate, these figures tend to show