

| | 1st Sample. | 2nd Sample. |
|---|-------------|-------------|
| Total gas, c.c. | 22·74 | 20·50 |
| Total gas less carbonic acid (CO ₂), „ | 16·12 | 14·70 |
| CO ₂ in total gas, per cent. | 29·12 | 28·29 |
| Oxygen (O ₂) in gas free from carbonic acid (CO ₂), „ | 12·03 | 14·47 |

In the process used for extracting the gases from the water the nitrogen and oxygen are completely extracted, and they are always accompanied by a certain portion of the carbonic acid. The total volume (reduced to 760 mm. and 0° C.) of gases so removed from a litre of sea water averaged for surface waters about 18 c.c., 15 per cent. of which, or about 3 c.c., usually consisted of carbonic acid. As the surface water contains on an average rather more than 20 c.c. of carbonic acid per litre which is eliminated by boiling with chloride of barium, it will be seen that only a very small percentage of the carbonic acid present in the water was so removed. When a second tube was adapted and the water boiled again, not more than 3 c.c., and rarely as much as 1 c.c., could be extracted, and it consisted entirely of carbonic acid.

The maximum amount of gas was found at Station 153 in the Antarctic Ocean, indeed almost on the Antarctic Circle. Excluding carbonic acid, the water contained 23·58 c.c. of nitrogen and oxygen, and 35·01 per cent. of it was oxygen. The minimum amount of gas was found between Stations 214 and 215, in lat. 4° 33' N., long. 127° 6' E., to the southeast of the Philippine Islands. Here the total gas, per litre of water, was only 13·73 c.c., of which 13·68 per cent. consisted of carbonic acid, leaving 11·85 c.c. of mixed nitrogen and oxygen, of which 33·11 per cent. was oxygen. The temperature was 27°·2 C. Excluding two values of 30·47 and 29·87 respectively, the lowest "oxygen percentage" found was 32·2, in lat. 3° 21' N., long. 145° 35' E., in the Pacific north of the Admiralty Islands. The temperature of the water was 28°·6 C. There were 13·47 c.c. of mixed oxygen and nitrogen. The variations in the gaseous contents of surface water are due mainly to temperature. It will be seen from Professor Dittmar's table that a litre of sea water is capable of taking up at 0° C. 23·78 c.c. of air freed from carbonic acid, and of the mixture so dissolved 34·4 per cent. is oxygen; at 30° C. it absorbs only 13·44 c.c., containing 33·47 per cent. of oxygen. The variations actually observed were greater, especially as to the oxygen percentage, which varied from 35·01 to 32·2. The Norwegians in their Arctic explorations found oxygen percentages as high as 36·7. Also there were greater variations in the absolute amount of gas dissolved than would have been expected from the table. The chief cause of variation is due to the barometric pressure, which has a range