

charged with dissolved gases than surface-waters; a considerable elevation of temperature being in *all* cases necessary for the evolution of any dissolved gas.

*Mode of examining Samples.*—The samples of water thus taken were examined with as little delay as possible, with a view to determine:—

- (1) The specific gravity of the water.
- (2) The total quantity of dissolved gases contained in them, and the relative proportions of oxygen, nitrogen, and carbonic acid.
- (3) The quantity of oxygen necessary to oxidize the organic matter contained in the water; distinguishing between *a*, the decomposed organic matter, and *b*, the easily decomposable organic matter.

(1) The specific gravity determinations were made at a temperature as near 60° Fahr. as possible, with delicate glass hydrometers, so graduated that the specific gravity could be read off directly to the fourth decimal place with ease.

(2) The apparatus for the analysis of the gases dissolved in the sea-water, was essentially that described by Prof. Miller in the second volume of his 'Elements of Chemistry.' It was found necessary to make several modifications in it, to adapt it to the motion of the vessel. These consisted chiefly in suspending much of it from the cabin-ceiling, instead of supporting it from beneath, and in rendering all the parts less rigid by a free use of caoutchouc tubing, &c., the utmost care being taken to keep all joints tight.

It was found possible to make correct analyses, even when the vessel was rolling sufficiently to upset chairs and cabin-furniture.

The method of analysis may be thus summarized:—From 700 to 800 cubic centimetres of the sample to be examined were boiled for about thirty minutes, in such a way that the steam and mixed gases evolved were collected over mercury in a small graduated Bunsen's gas-holder, all access of air being carefully guarded against. The mixed gases were then transferred to two graduated tubes in a mercurial trough, where the