

experiment, but are not in general use. The one consists in measuring the refractivity of the water, *i.e.* the deflection undergone by a ray of monochromatic light when passing from air to water; this quantity, again, stands in definite relation to the salinity of the sample. The other method is based on the electrolytic conductivity of sea-water, and has the advantage that no sample need be brought up, a pair of electrodes being simply sent down to any required depth and the readings being taken on board. This method has been applied by Martin Knudsen with good results in shallow water.

The most convenient, and on the whole the most satisfactory, method of determining salinity is a chemical one, and is based on the fixed relation between the chlorine contained in a sea-water and its total salinity. Chemical methods.

The amount of chlorine can be determined by a rapid and easy method. When a solution of silver nitrate is added to sea-water, the chlorine is thrown down as a white precipitate of silver chloride. If a few drops of yellow chromate of potassium are added it is easy to see when all the chlorine is precipitated, for the silver nitrate will then act on the chromate so that the yellow colour is changed into red. When the chlorine content of a water-sample is to be determined, a certain quantity (*e.g.* 15 c.c.) is measured off and poured into a glass; a few drops of the yellow chromate solution are added as an indicator, and then nitrate of silver from a burette, that is, a graduated glass tube with a stopcock (for discharge) at the lower end (see Fig. 164). When the red colour appears, the burette is read off to find out how much silver solution has been added, and it is easy from this value to calculate the amount of chlorine. From Knudsen's Hydrographical Tables the salinity or the specific gravity, corresponding to this chlorine-value found by titration, may be determined. All this can now be done quickly and accurately; in fact, the salinity of a water-sample is determined in less than five minutes to within about  $\frac{1}{100}$  *per mille*, *i.e.* 1 centigram of salt per kilogram of sea-water. The modern method of chlorine titration is a great improvement on former methods, and it has been much used in recent oceanographical work, thousands of such determinations being now made yearly. Chlorine titration.

The density of sea-water depends both on the salinity and on the temperature; the water is comparatively light when the salinity is low and the temperature high, and increases in density with a rise of salinity and a fall of temperature. Density of sea-water.