

bottle; when the water-bottle is reversed the bar is withdrawn, and the messenger is let go. The next water-bottle is knocked over, releasing in its turn the following messenger, and so on. It is indispensable with this, as with all other water-bottles, that when closed it should be absolutely water-tight, otherwise water might get in from the higher layers and vitiate the sample.¹

The water-sample, when brought on board, may be dealt with at once, and its salinity, etc., determined, but it is generally the best plan to store the samples for examination in a shore laboratory. In this case the samples must be preserved absolutely air-tight, so that they shall not suffer any change in the interval. As a rule, the water may be kept in good glass bottles with lever stoppers, like those used in soda-water bottles. Cork stoppers will not do, unless capped with paraffin or wax, as it is difficult to avoid some degree of evaporation which would invalidate the results.

Preservation
of water-
samples for
examination
on shore.

The chemical composition of sea-water has been very carefully determined. Wellnigh all known elements are found in solution in the sea, but most of them in such small quantities as to be detected only by the most delicate methods. A kilogram of sea-water contains about 35 grams of solid substances altogether; the quantity varies slightly in different places, but on an average there are about 35 weight-units of solids in 1000 weight-units of sea-water (35 per thousand). According to the results of Dittmar's analyses of the "Challenger" water-samples there are on an average in 1000 grams of sea-water:—

Chemical
composition
of sea-water.

	Grams.	Percentage on total solids.
Sodium chloride (NaCl)	27.213	77.76
Magnesium chloride (MgCl ₂)	3.807	10.88
Magnesium sulphate (MgSO ₄)	1.658	4.74
Calcium sulphate (CaSO ₄)	1.260	3.60
Potassium sulphate (K ₂ SO ₄)	0.863	2.46
Calcium carbonate (CaCO ₃)	0.123	0.34
Magnesium bromide (MgBr ₂)	0.076	0.22
Total	35.000	100.00

¹ The highest perfection must be exacted with regard to this point. It formerly frequently occurred that the instruments leaked a little; as the knowledge of the sea has grown, many