

the time, it is necessary, in order that the results may be comparable, to reduce them to their values at one common temperature. For this purpose a knowledge of the law of expansion of sea-water with temperature is necessary. This had been determined with sufficient accuracy for low temperatures by Despretz and others; but as the temperatures at which specific-gravity observations are usually made are comparatively high, their results were of but little use, directed as they were chiefly to the determination of the freezing and maximum-density points. When the late Captain Maury was developing his theory of oceanic circulation, owing to difference of density of the water in its different parts, he found the want of information on this important subject. At his request the late Professor Hubbard, of the National Observatory, United States, instituted a series of experiments, from which he was enabled to lay down a curve of the volumes of sea-water at all temperatures from considerably below the freezing-point to much above what obtains even in the hottest seas. The results are published in Maury's "Sailing Directions," 1858, vol. i., p. 237, and have evidently been carried out with great care. The composition of different oceanic waters varies, even in extreme cases, within such close limits, that the law of thermal expansion is sensibly the same for all of them: of this Hubbard's experiments afford satisfactory proof. In the table which gives the results of all his experiments, he takes the volume of water at 60° F. as his unit.

In the following table the volumes for every centigrade degree from -1° C. to +30° C. are given:

Temp. ° C.	Volume.						
-1	0·99792	+7	0·99853	+15	0·99987	+23	1·00194
0	795	8	866	16	1·00010	24	224
+1	799	9	878	17	034	25	256
2	804	10	893	18	059	26	288
3	812	11	910	19	086	27	320
4	820	12	927	20	111	28	352
5	830	13	947	21	137	29	385
6	840	14	967	22	164	30	420