

a clue to the presence of lime, in combination with a stronger acid than the carbonic.

7. After boiling and filtration, lime water throws down a precipitate, soluble in hydro-chlorate of ammonia; and phosphate of soda, and carbonate of ammonia, with boiling, induces likewise a white precipitate—magnesia.

8. Nitrate of silver throws down a heavy curdy precipitate, indicating chlorine.

9. Starch, sulphuric acid, and chlorine water, added to the cooled liquid after boiling, in the usual manner, was attended, after a short time, with the production of a purple streak at the line of junction of the liquid and supernatant chlorine water, thus affording evidence of the presence of iodine.

10. Cautious evaporation to dryness was attended with a distinct crystallization, the crystals assuming the cubic form, bearing every resemblance to common salt.

11. Carbazotic acid, added to a concentrated solution, was not attended with the formation of any precipitate, thus proving the absence of potassa.

12. To determine whether any magnesia existed in the precipitate obtained by simply boiling the water, the following experiments were adopted:—Eight ounces were boiled, and the precipitate carefully collected on a filter, and washed. It was now dissolved in hydro-chloric acid. To one portion was added oxalate of ammonia, to precipitate the whole of the lime, and it was now re-filtered. To the filtered solution a sufficiency of ammonia was added, to neutralize any free hydro-chloric acid, and caustic potassa was then added, and the whole boiled, but no precipitate appeared. To another portion, phosphate of soda, and carbonate of ammonia were added, after the precipitation of the whole of the lime by oxalate of ammonia. This also was submitted to ebullition, but no precipitate took place,—thus indicating by these two experiments an absence of magnesia, and permitting us to infer that the precipitate obtained by boiling the liquid was simply carbonate of lime.

The inference is thus deduced, that the water holds in solution the following substances:—

Carbonate of Lime,	Chlorine,
Carbonic Acid,	Iodine,
Lime,	Sodium.
Magnesia.	

II. Quantitative Analysis.

1. An eight ounce phial was obtained, accurately balanced, and into it was poured 1,000 grains of the water. Having been placed in a sand bath, it was allowed cautiously to evaporate to dryness, and the phial was kept exposed to the same temperature as that at which the evaporation was conducted, for at least an

hour, until in fact it was sensibly dry. On being weighed a second time, it was found to have increased in weight by 9.40 grains, which is therefore the weight of dried solid material in 1,000 grains of the water.

2. 1,000 grains were boiled, and the carbonate of lime, which precipitated, was collected on a weighed filter, and dried. It weighed 0.300 grs., and consisted of 0.168 lime, and 0.132 carbonic acid.

3. 1,000 grains were precipitated by barytic water. The precipitate was carbonate of barytes and carbonate of lime; it was collected on a filter, washed, and dried; and was found to weigh 4.15 grs., of which the proportion of the carbonic acid to the lime was 0.132, and to the barytes, 0.859, yielding in toto 0.991 grs. of carbonic acid.

4. After boiling, 4,000 grains were precipitated by oxalate of ammonia. The precipitate collected on a weighed filter, washed and dried, weighed 2.65 grains, furnishing for every 1,000 grains of the water, the proportion of 0.662 grains of oxalate of lime, equivalent to 0.061 calcium.

5. 3,000 grains were freed from lime by oxalate of ammonia, and treated with phosphoric acid and carbonate of ammonia, and boiled. The ammonia-phosphate obtained, weighed, after careful drying and exposure to a gentle heat, 5.14 grs. or 0.685 of magnesium, for the 3,000 grains of water experimented on, or 0.228 magnesium per 1,000 grs., giving 0.371 magnesia.

6. 4,000 grains were precipitated by nitrate of silver. It was chloride and iodide of silver, and weighed conjointly, after a cautious fusion, 88.12 grains. It was now placed in a tube, and after having been heated, a current of chlorine gas was steadily passed over it. On being weighed a second time, it was found to have lost 0.08 grs., equivalent to 0.027 of iodine, per 1,000 grains of the water. The residue yielded a proportion of 5.439 grains of chlorine, to every 1,000 grains of the water.

7. 1,000 grains were freed from lime and magnesia, and cautiously evaporated to dryness; the saline residue weighed 7.79 grains, furnishing us a proportion of 3.091 of sodium.

The above investigation furnishes, as the proportion of the solid and gaseous constituents of 1,000 grains of the water, the following summary:—

	Grains.
Carbonic Acid combined,	0.132
Calcium, in combination probably with Chlorine,	0.061
Lime,	0.168
Chlorine,	5.439
Magnesia,	0.371
Sodium,	3.091
Iodine,	0.027
	9.299
Carbonic Acid in gaseous state,	0.859

These were probably combined in the following manner:—