

Mr. HUNTINGTON explained that as it had been necessary to omit the Tables in the reading of the Paper, he wished to say that they showed :—

1. Results of Messrs. Maudslay and Field's experiments as to the relative temperatures of the brine and steam.
2. Results of Mr. Seaward's ditto ditto.
3. Analyses of different sea waters by Dr. Ure, Dr. Lardner, Dr. Murray, Schweitzer, and Laurens, and of common salt by Dr. Henry.
4. Experiments on the densities of different solutions.
5. Chemical analysis of salt.
6. Results of Gay-Lussac's experiments, to show that when the temperature of the water is raised, a greater quantity of common salt is required to saturate the solution.
7. Value of multiplier for pressures varying from 1 lb. to 20 lbs. per square inch above the atmosphere, in rule for determining the time required to acquire any concentration.
8. Results of Tredgold's experiments on the boiling points of solutions.
9. Results of experiments on the boiling points of solutions.
10. Sir G. Shuckburgh's barometric boiling points.
11. Dalton's pressures of steam near the atmospheric boiling point.
12. Correction of boiling points.
13. Capacities for heat of common salt, as determined by M. Gadolin.
14. Freezing points of different solutions, as determined by Mr. Griffith.
15. Capacity for heat of saline solutions.
16. Results of Watt's experiments with steam of a saturated solution.
17. Differences between the temperatures of the water and steam at several densities.
18. Temperatures of steam, at different pressures.
- 19 and 20. Showing the fuel required for a given capacity of boiler and pressure of steam.
21. Results of De Luc's experiments as to expansion of saturated solution of salt and of pure water.
22. Results of Dalton's and Gilpin's experiments on the expansion of pure water.
23. Results of experiments on the expansion of a saturated solution of salt.
24. Showing the loss of specific gravity by the expansion of pure and salt water.
25. For calculating corrections for the expansion of water and salt.
26. Showing graduations for salinometer scales.
27. Ditto corrections for the water.
28. Ditto for the salt and temperature.

Dr. RITTERBANDT said, it remained with the engineers to agree upon an instrument to determine the saltiness of water. He had found that, in many parts of the United Kingdom, the instruments used for that purpose were different. If correct

results were to be arrived at, it was absolutely necessary that one and the same description of instrument should be adopted, so as to induce uniformity in the observations. He considered that it would be useful to have an indicator of brine saturation, out of the reach of the engineer; it would be safer in that position, and would undoubtedly lead to economy of fuel. As regarded the density of the water, supposing it to contain 3·5 per cent. of salt, if the engineer permitted eight times that amount, it would equal 28 per cent., which was too dense to be economical. Water would absorb a quantity of salt, which would raise its specific gravity to three times this amount, but at that degree it would be dangerous. There was very little salt really precipitated in the boilers; it was chiefly an incrustation, resembling salt somewhat in appearance, and consisting of carbonates of lime and magnesia, with small portions of sulphate of lime and of some common salt, if the density of the brine had been allowed to rise to its point of saturation.

Some time since he had used muriate of ammonia for preventing incrustation in marine and other boilers. It succeeded excellently with fresh water containing carbonate of lime. With salt water it did not absolutely prevent all incrustation, but it retarded its progress, and therefore the boilers did not require to be blown out so frequently. By the use of muriate of ammonia no great amount of incrustation was formed on the voyage, and on arrival in port the boiler was easily cleaned out.

In 1847, the Admiralty ordered some experiments to be tried at Portsmouth, to test the merits of the application. The practice had been to blow off when the hydrometer indicated 18° and 19°. By the use of muriate of ammonia, it was found that there was no incrustation, or deposit, even when the water had arrived at 60° hydrometer, or above three times the ordinary point of blowing off. In fact, the necessity of blowing off at 19° or 20° did not arise from the accumulation of salt in the water at this density, but from the deposition of the carbonates of lime and magnesia, held in solution by the free carbonic acid, which was expelled when arriving at this point, and this, the addition of muriate of ammonia completely prevented, so that the concentration of the water could be carried up to the point of saturation by the salt, but could not be carried beyond it, for then salt itself was deposited.

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