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## On the Existence of a Minimum Volume in Solution

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## ON THE EXISTENCE OF A MINIMUM VOLUME IN SOLUTION.

BY LEROY D. WELD.

This research has for its general object to inquire into the physical condition of substances in near-saturated aqueous solution.

The subject was attacked by means of experiments at different temperatures on the *apparent specific volume in solution*; by which is meant, the volume of that amount of solution which contains one gram of the solute, minus the natural volume of the water contained therein. This quantity is always somewhat less than the volume of the solid solute.

The experiments were made upon the sparingly soluble salt, potassium chlorate, dissolved in water at ordinary temperatures, by means of a specially designed pycnometer and thermostatic apparatus, and by employing special precautions against errors due to evaporation, unequal heating of the balance, etc.

The results are of surprising interest, as they clearly indicate the existence of a minimum specific volume (maximum density) in the dissolved substance itself, in the near vicinity of the saturation point, which is very strongly suggestive of the maximum density of water just above its freezing point. The minimum volume of the potassium chlorate occurs slightly below its saturation temperature, that is, when slightly supersaturated; this is attributed to the presence of the water, just as the presence of a solute in water may bring the minimum volume temperature of the latter down below freezing, the impure water being then supercooled. The greater the amount of water present, the farther is the minimum specific volume point of the dissolved potassium chlorate found to be below the saturation temperature, which is also in agreement with the behavior of impure water. Special observations were made to detect the slightest trace of crystallization in the supersaturated solution, without success; while, to account for the results on this supposition, it would be necessary to assume that fully one-fourth of the chlorate had crystallized. The writer believes these results indicate a true minimum volume, analogous in all respects to that of water at four degrees centigrade.

Further experiments are in progress, and it is expected that a detailed account of the work will be duly published in the proceedings of the American Physical Society.