The Exact Dilution of Liquid Reagents by Formula.—While a full set of hydrometers should be included in the equipment of every general laboratory, there may be, nevertheless, occasions when such instruments are not readily available. But even where no such lack of apparatus exists, there are a great many cases when, I believe, it is far easier and more convenient to accurately prepare solutions of any required specific gravities by the use of a simple, general formula, rather than by hydrometer.

Quite frequently the dilution of a reagent is attended by a considerable rise of temperature, which must either be reduced before a hydrometer reading can be taken or else the latter must be corrected, an operation necessitating not only the use of a thermometer but also more or less calculation. Then, too, there are many occasions when the quantity of solution required does not afford sufficient volume to permit the use of an ordinary hydrometer.

Suppose it be required to prepare a volume, V_t, of a solution whose specific gravity shall be S_2, by the dilution of a volume, V_x, of a reagent whose specific gravity is S_1. The problem is to ascertain the volume, V_x.

$V_t - V_x =$ amount of water necessary for dilution.

From the equation $V_x S_1 + V_t - V_x = V_t S_2$ it is found that $V_x = \frac{V_t(S_2 - 1)}{S_1 - 1}$.

Conversely, if it be required to dilute an exact volume of a liquid of certain specific gravity to one of different specific gravity, then by transposition: $V_t = \frac{V_x(S_1 - 1)}{S_2 - 1}$.

It is frequently required to dilute to a certain specific gravity with some reagent other than water. In this case, first consider water as the diluting agent, and find V_t as above. Then, if $S_3 =$ the specific gravity of the diluting reagent: $\frac{V_t + V_x}{S_3} =$ the volume of the same necessary to be added to volume V_x to give a liquid of the specific gravity required.

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