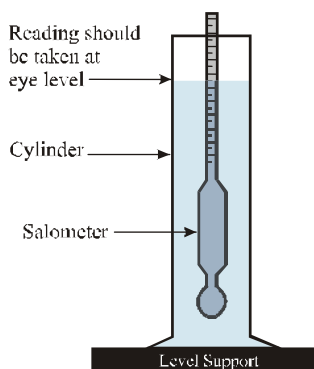


## The Salometer and How to Use It

The most common industrial instrument for measuring liquid density is the hydrometer and the most common of the hydrometers used to measure brine strength is the Salometer. The Salometer scale directly indicates the percent of saturation of the brine, reading 0° in pure water and 100°S in fully saturated brine. By definition, the Salometer degree indicates the percent of saturation, i.e. a 70°S is 70 percent saturated. Therefore, in calibrating Salometer scales or computing brine tables based on this scale, it is necessary first to establish the percent value of a fully saturated brine as the fundamental unit and then divide this percent into 100 parts. The Salometer degree and the percent salt are thus rigidly tied together by formula:

$$\text{Degrees S} = \frac{\% \text{ salt - brine}}{\% \text{ salt - saturated brine}} \times 100$$

Occasionally a special type of Salometer is used in the canning industry and for testing brine used in quality grading. It is graduated on a scale where 100°S represents brine containing 25% salt, instead of saturated brine containing 26.395% salt.



Ordinarily, Salometers are scaled for reading at a temperature of 60°F, but special Salometers are available for the meat packing industry scaled for readings at 38°F.

### Errors in reading a Salometer

Considerable error may result from readings made with the correct Salometer at the correct temperature if proper procedure is not used. The following suggestions will help in securing correct Salometer readings.

1. Temperature of the brine should be the same as specified in the brine table being used. A 60°F Salometer will not give a correct reading at 38°F and vice versa.
2. Brine should be tested only in a straight walled cylinder of clear glass, set solidly on a level surface. Any moisture that collects on the outside of the cylinder should be wiped off.

3. Make sure that the Salometer stem is dry, clean, and free from grease, or caked salt crystals, and that the Salometer does not touch the sides of the cylinder when readings are taken.
4. Check new Salometers by placing them first in clear water, when the reading should be 0°S at 60°F. Empty the cylinder, rinse with a saturated salt solution, then refill with saturated brine at 60°F. Salometer should read 100°S.
5. Care must be taken to read the scale marking at the actual surface of the brine when the Salometer has come to rest. This brine surface is not level, as brine tends to rise along the sides of the cylinder and along the stem of the Salometer, forming a concave surface known as a meniscus. For a correct reading, bring the eye to a point level with the *bottom* of the meniscus.

## Explanation of Hydrometer Scales

Density is defined as weight per unit volume (pounds per gallon, grams per milliliter, pounds per cubic foot, etc.) Specific gravity of liquids and solids is the density compared with that of water at 4°C.

Density of liquids is determined: (1) by weighing a known volume, or weighing equal volumes of water and the liquid and comparing (pycnometer); (2) by determining the loss in weight of a plummet of known volume weighed in air and in the liquid, or by comparing the weight of a plummet of unknown volume weighed in water (at 4°C) and in the liquid

(Westphal balance); or (3) by means of hydrometers, weighted glass floats which sink in the liquid to a depth dependent on the density, which is read at the liquid line on a calibrated stem extending above the liquid.

Hydrometers are calibrated (1) in terms of specific gravity of liquid at 60°F compared with water at 60°F (called Sp. Gr. 60° / 60°F); (2) in percentage of a substance in a solution or mixture; or (3) in arbitrary divisions, such as degrees Baumé (Be.) degrees Twaddell (Tw.), degrees Salometer (S.).

## For Liquids Heavier than Water

Degrees Salometer	by far the most common of all the hydrometer scales used for testing brines. The scale indicates directly the percent saturation of the brine, reading 0°S in pure water, and 100°S in fully saturated brine. Since saturated brine contains 26.395% salt by weight, each Salometer degree represents 0.26395% salt.
Degree Barkometer	commonly used for testing density of tanning liquors. °Bk = 1000 (Sp. Gr. - 1.000)
Degrees Twaddell	a scale similar to the Barkometer scale, and widely used in England. °Tw = 200 (Sp. Gr. - 1.000)
Degrees Baumé	an arbitrary scale originally intended to indicate % salt in brine. $^{\circ}Be = 145 \frac{145}{Sp. Gr.}$
Degrees Brix (Balling)	used in the sugar industries; each degree Brix represents percent sugar (sucrose).