

CHLORINATED SOLVENTS – DENSITY

PCH-2900-0011 (annex to PCH-29x0-0001)

Definition

The **density**, ρ_t , named also weight per millilitre, is the mass of a unit volume of a substance at the temperature t . It is usually expressed in grams per cubic centimetre, but can also be expressed in kilograms per cubic metre.

The **relative density**, $D_{(t_1/t_2)}$, is the ratio of the mass of a certain volume of a substance at a temperature t_1 to the mass of an equal volume of a reference liquid at temperature t_2 . The relative density is dimensionless.

When the reference liquid is water (and this is mainly the case), it is also named specific gravity.

$D_{(20/4)}$ is the most commonly used relative density. Since the density of water at 4°C is very close to 1g/cm^3 (0,99997), $D_{(20/4)}$ can be considered to be equal to the numeric value of the density ρ_{20} expressed in grams per cubic centimetre.

Density is traduced in French by "Masse volumique"; Relative density is traduced in French by "Densité".

Calculation

The water density is the following:

Temperature, °C	Density, g/cm ³
4	1,0000
20	0,9982
25	0,9970

Reference: "Water: Density at Atmospheric Pressure and Temperature from 0 to 100°C", Tables of Standard Handbook Data, Standartov, Moscow, 1978.

The density is linked to the relative density by the following formula:

$$\rho_{20} = 0,9982 \times D_{(20/20)}$$

$$\rho_{20} = 1,0000 \times D_{(20/4)} = D_{(20/4)}$$

The relative densities are linked together by the following formula:

$$D_{(20/4)} = 0,9982 / 1,0000 \times D_{(20/20)} = 0,9982 \times D_{(20/20)}$$

$$D_{(25/25)} = f \times D_{(20/4)}$$

With f, correction factor depending on the solvent :

Chlorinated solvent	f
Methylene chloride	0,99610
Chloroform	0,99650
Carbon tetrachloride	0,99675
Perchloroethylene	0,99784

Reference: Solvay.

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