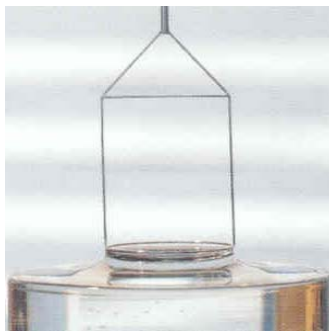


FIELD OF ACTIVITY



Hydrometers calibration



Surface tension certification



Standard of density of liquids

The Physical-Chemistry Laboratory is responsible for the development, and maintenance of the national standards of liquids density, viscosity, surface tension, refractive index, handling to do:

- Calibration;
- Certification;
- Provides testing for legal metrology;
- Participation and coordination of interlaboratorial comparisons.

SI UNIT

Derived units of the International System (SI):

Volumic mass (ρ): kilogram per cubic meter (kg/m^3 or kg/L) defined as:

The mass divided by volume.

Viscosity, dynamic viscosity (η or μ): pascal second (Pa·s) defined as:

$$\tau_{xz} = \eta \times \frac{dv_x}{dz} \text{ where } \tau_{xz} \text{ is the shear stress in a fluid moving with a velocity gradient}$$

dv_x/dz , perpendicular to the plane of shear.

Kinematic viscosity (ν): square meter per second (m^2/s) defined as:

$$\nu = \eta / \rho \text{ where } \rho \text{ is the volumic mass.}$$

Surface tension (σ): newton per meter (N/m) defined as:

Force perpendicular to a line element in a surface divided by the length of the line.

Refractive index (n), dimensionless or dimension one quantity defined as:

The ratio of the velocity of light in standard air to the velocity of light in the medium.



TRACEABILITY

The measurements traceability is obtained to national and international standards, and to certified reference materials.

The accuracy of the measurements performed is proven through the participation in projects and in international comparisons, and it is demonstrated by the acceptance and inclusion of the Measurement and Calibration Capabilities (CMC) in the BIPM database.

AVAILABLE SERVICES**Calibration**

EQUIPMENT	RANGE	UNCERTAINTY
Hydrometers	(0,5 to 2,0) g/cm ³	(1/5 to 1/10) scale division
Digital densimeter	(0,5 to 2,0) g/cm ³	0,1%
Capillary viscometer	(0,001 to 30) mm ² /s ²	0,6%
Breath analyzer	(0 to 3) g/L TAS	0,01 g/L
Tensiometer	(0 to 85) mN/m	(0,1 to 0,8) mN/m
Refractometer	(1,320 0 to 1,580 0) n	0,02%

Certification:

Reference Material	GAMA	INCERTEZA
Density	(0,5 to 2,0) g/cm ³	0,1%
Refractive index	(1,320 0 to 1,580 0) n	0,02%
Surface tension	(0 to 85) mN/m	(0,1 to 0,8) mN/m
Viscosity	(1,2 a 20 000) mm ² /s	0,6%

Metrological Control

EQUIPMENT	TESTS	LAWS
Breath analyzer	Type Approval 1 st Verification Periodic Verification	DL n.º 124/90 Portaria n.º 627-B/93 Portaria n.º 748/94
Refractometer	Type Approval 1 st Verification Periodic Verification	Portaria n.º 955/92

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