

Non analytical instruments

Quality control & maintenance

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Analytical instruments

- Used to calculate exact proportion in which various constituents are present in a substance
- For example: Automated hematology analyzer measure RBC, WBC, Platelet, Hb, MCV

Non-analytical instruments

- Used to measure various physical quantities
 1. Pressure,
 2. Temperature,
 3. Level,
 4. Flow etc

List of Non analytical instruments

Centrifuge

Pipette

Thermometer

Refrigerator

Hot air oven

Autoclave

Incubator

Biological safety cabinet

Vortex mixer

Manual differential counter

Weighing machine

Quality control & maintenance

- Calibrate instrument with standard
- Yearly/bi-annually or after replacement of a major part
- Calibration : measurement of trueness with the help of standards

Quality control contd...

- Standard : Device with known or assigned correctness
- Traceability : Standard can be related to references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties

Quality control contd...

A frequently asked question is:

"Why should I calibrate my instrument?"

Calibration gives

- confidence &
- assures that measurements are accurate within the specification limits

In-house Calibration

- Calibrated tachometer: centrifuge
- Calibrated digital temperature sensor: checking temperature of refrigerator, incubator etc
- Calibrated glass thermometer: temperature checking of oven, water bath
- Calibrated weights: balance

External agencies for calibration

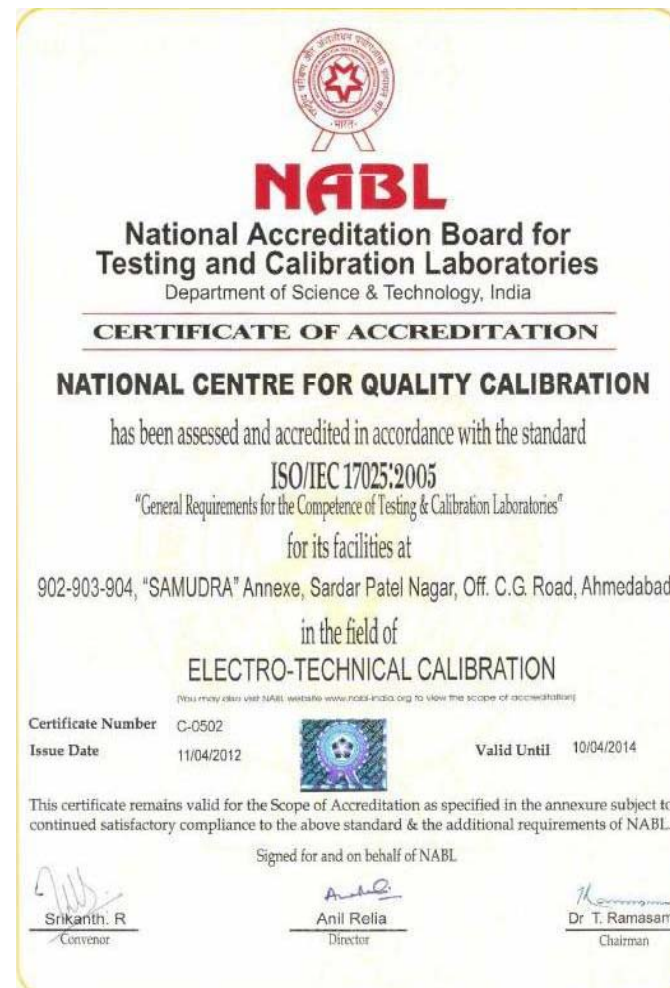
- Calibrated by accredited calibration laboratory or done in-house with traceability to National Physical Laboratory (NPL), New Delhi,
- Measurement standard of India
- Maintains standards of [SI units](#) in India
- Calibrates the national standards of weights & measures

External agencies

- **National Centre for Quality Calibration (NCQC)**
- Independent calibration laboratory established since 1998, India
- Test & measure instruments with calibrated masters in the field of Temperature, Dimensional, Pressure, Vacuum, Time, Mass, Electrical, Noise, Airflow
- All Special Purpose instruments in all ranges

External agencies contd...

- NCQC is ISO/IEC 17025 accredited calibration laboratory by NABL




Maintenance of Non analytical instrument

- Maintain instrument properly with daily cleaning with cleansing agents like
 1. Diluted Na-hypochlorite
 2. 70% alcohol &
 3. Yearly before calibration or
 4. After breakdown

Maintenance of Non analytical instrument contd...

Anaerobic jars
autoclaves
hot air oven



use chemical and/or biological
indicator

Chemical indicator e.g. Browne's tube

Assess the physical condition of instrument

Biological indicators –

e.g. spores of *Bacillus stereothermophils* &
Clostridium tetani

Verify instrument's ability to sterilize

Centrifuge



Intended use	Maintenance Schedule	Calibration
Separation plasma/serum (separate components of mixture on basis of particle size/ density)	Yearly before calibration or after a breakdown	Bi-annual or after replacement of a major part

Calibration of centrifuge



- **Tachometer** : measures rotation speed of shaft or disk
- Device usually displays revolutions per minute (RPM) on a calibrated analogue dial
- Digital displays are increasingly common

Pipette



Intended use	Maintenance Schedule	Calibration
For dispensing accurate amount of reagents, sample	Yearly as a part of pre-calibration check or after breakdown	Biannually

Calibration of pipette

- Numerous ways
 1. measuring of radio nuclide,
 2. color change reactions,
 3. air pressure/vacuum testing,
 4. and gravimetric



Calibration of pipette contd...

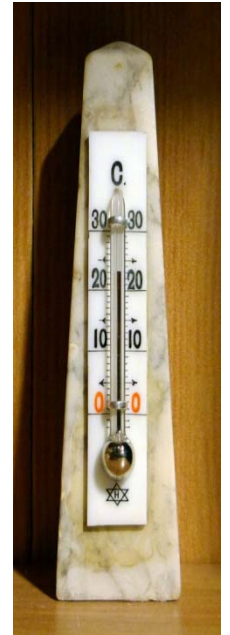
Gravimetric : measuring the weight of water a pipette dispenses at a given dial setting

- weight converted into volume by using the physical property of water density

$$\text{Volume } (\mu\text{l}) = \frac{\text{Weight of water dispensed (mg)}}{\text{density of water (mg/ml)}}$$

- One of the most accurate ways
- Accepted standard for calibration of pipettes

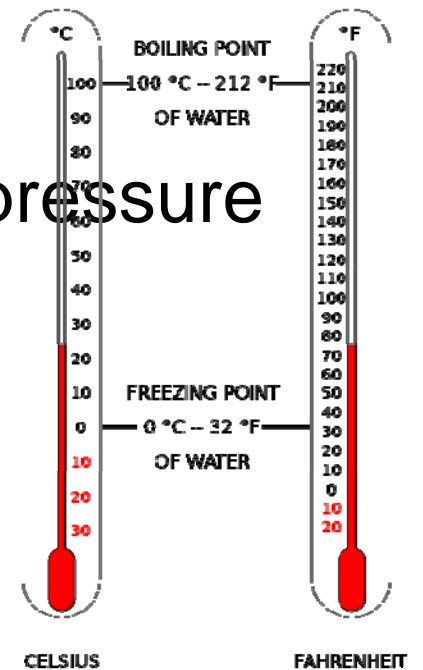
Thermometer



Intended use	Maintenance Schedule	Calibration
For measurement of room, water bath, hot air oven, refrigerator & deep freezer temperature	Not applicable	Annually

Calibration of thermometer

- Comparing them with other calibrated thermometers or
- Check them against known fixed points (melting & boiling points of pure water)
- Note: Boiling point of water varies with pressure
- So this must be controlled



Take home message

- Non analytical instruments are as important as analytical instruments
- Proper maintenance & quality control is essential for accurate & precise results

THANK
YOU

