

ANALYTICAL EQUIPMENT

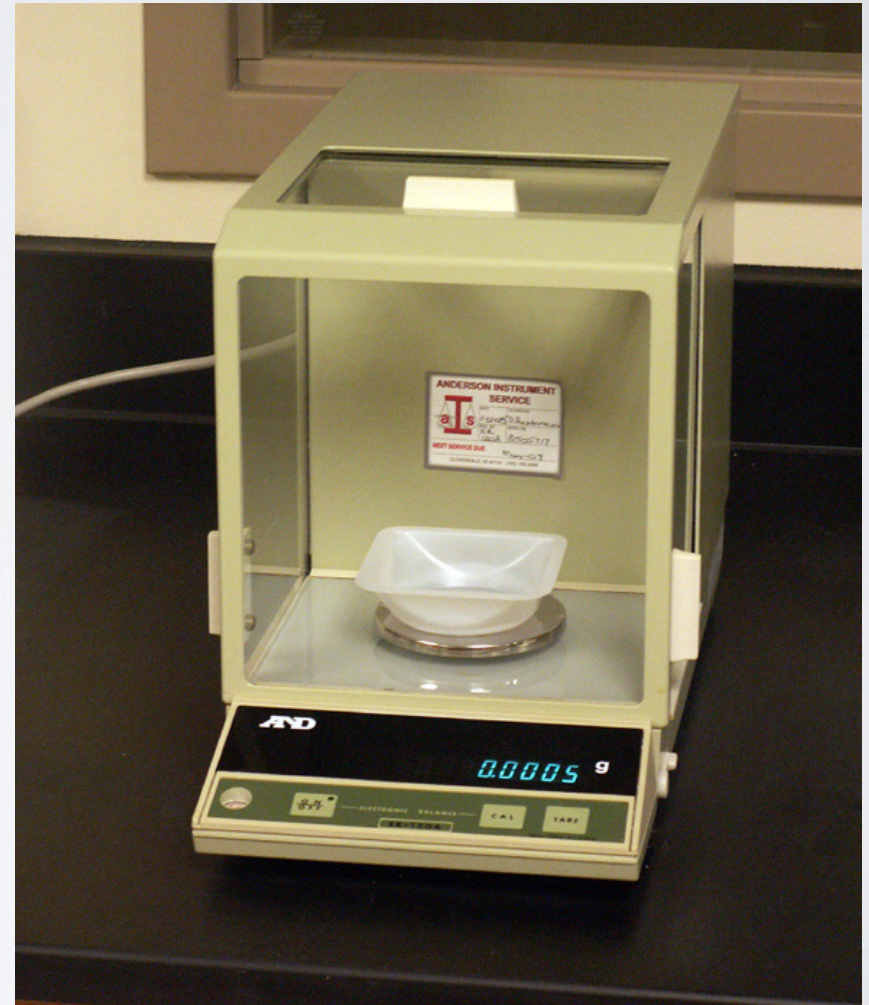
CHEM 25 | SDSU

ANALYTICAL EQUIPMENT

- In any chemistry lab there exists a range of equipment of varying quality.
- When an analytical chemist is doing quantitative work it is important to know the limitations of the equipment being used as that has an impact on the results of the analysis.
- Basic measurement equipment in the lab will either measure the mass or the volume of a substance.

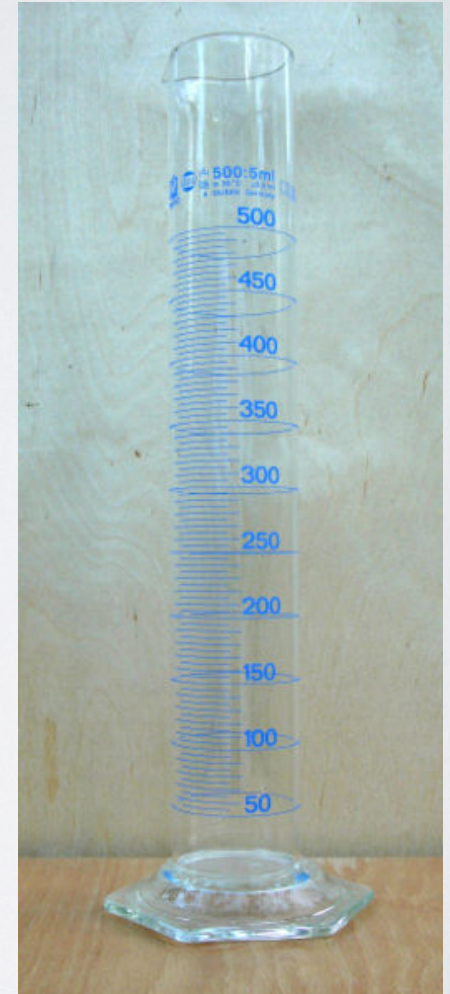
MASS MEASUREMENTS

- Measurements of mass are done with analytical balances.
- The balance must be level and clean before using.
- Typical analytical balances can measure masses to the nearest ± 1 mg or ± 0.01 mg.
- All balances have an upper limit on the mass they can measure.



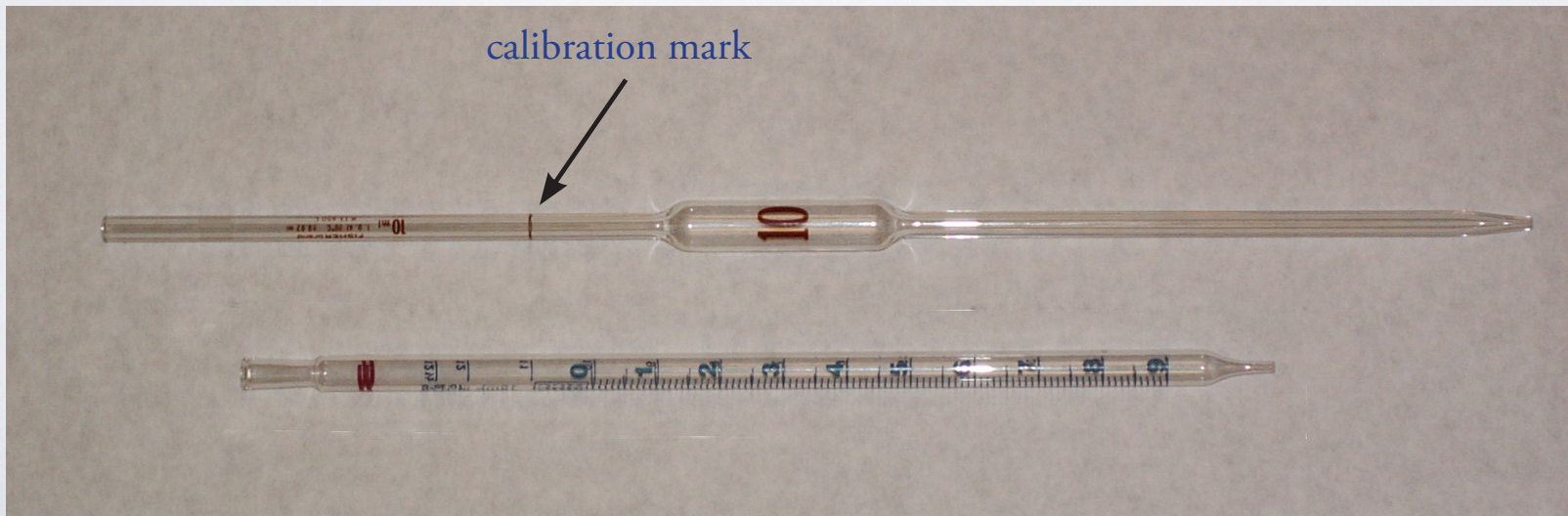
VOLUME MEASUREMENTS

- There is a wide range of quality in the glassware that can be used for measurements.
- For example beakers are accurate to about $\pm 5\%$ of the indicated volume.
- Meaning 200 mL in a beaker could be anywhere between 210 and 190 mL!
- A graduated cylinder is much more accurate at $\pm 1\%$ the indicated volume.



VOLUMETRIC PIPETS

- Volumetric pipets are used in the lab to accurately deliver known volumes of solution.
- A typical 10 mL transfer pipette is accurate to ± 0.02 mL, meaning you transfer between 10.02 and 9.98 mL (much better than a beaker).
- The uncertainty can be further reduced by calibrating the pipet, which you will do in the lab.



VOLUMETRIC FLASKS

- Volumetric flasks are designed to prepare and contain known volumes of solutions.
- The accuracy of volumetric flasks varies with their total volume, and is often indicated on the glassware.
- **A 100 mL vol. flask is typically ± 0.08 mL**
- Always dissolve solids completely before filling the flask to the calibration mark.
- Always invert & mix the flask before delivering solution from it.



TO DELIVER VS. TO CONTAIN GLASSWARE

- If you pay attention to your glassware you will note that volumetric glassware is often marked with **TD** or **TC** (and sometimes both).
- These markings indicate the intended purpose of the glassware and how the volume was calibrated.
- **TD** glassware is calibrated **to deliver** a given volume. A 10 mL pipet will contain more than 10 mL of solution, but will only deliver 10 mL.
- **TC** glassware is calibrated **to contain** a given volume. Solutions delivered from a TC container will likely be less than the calibrated volume.