CHEMICAL STANDARDS

STANDARDS PREPARATION

Chemical standards are materials containing a known concentration of an analyte. They provide a reference to determine unknown concentrations or to calibrate analytical instruments. The accuracy of an analytical measurement is how close a result comes to the true value. Determining the accuracy of a measurement usually requires calibration of the analytical method with a known standard. This is often done with standards of several concentrations to make a calibration or working curve.

PRIMARY STANDARDS

A primary standard is a reagent that is extremely pure and stable and has no waters of hydration and has a high molecular weight.

SOME PRIMARY STANDARDS FOR TITRATION OF ACIDS

- **Sodium carbonate Na_2CO_3, mol wt – 105.99g/mol**
- **Tris –(hydroxymethyl)aminomethane (TRIS or THAM): $(CH_2OH)_3CNH_2$, mol wt = 121.14g/mol**

SOME PRIMARY STANDARDS FOR TITRATION OF BASES

- **Potassium hydrogen phthalate $KHC_8H_4O_4$, mol wt = 204.23g/mol**
- **Potassium hydrogen iodate $KH(IO_3)_2$, mol wt = 389.92g/mol**

PRIMARY STANDARD FOR REDOX TITRATION

- **Potassium dichromate $K_2Cr_2O_7$, mol wt = 294.19g/mol**

SECONDARY STANDARDS

A secondary standard is a standard that is prepared in the laboratory for a specific analysis. It is usually standardized against a primary chemical standard.

HANDLING OF CHEMICAL STANDARDS

HANDLING

- **Never put solution transfer devices into the standard solution. This precaution avoids possible contamination from the pipette or transfer device.**

- **Always pour an aliquot from a standard solution to a suitable container for the purpose of volumetric pipette solution transfer and do not add the aliquot removed back to the original standard solution container. This precaution is intended to avoid contamination of the stock standard solution.**

- **Perform volumetric pipette solution transfer at room temperature. Aqueous standard solutions stored at "lower" temperature will have a higher density. Weight solution transfers avoid this problem provided the density of the standard solution is known or the concentrations units are in wt/wt. rather than wt/volume.**

- **Never use glass pipettes or transfer devices with standard solutions containing HF. Free HF attacks glass but it is sometimes considered safe to use glass when the HF is listed as trace and/or as a complex. However many fluorinated compounds will attack glass just as readily as free HF.**

- **Don't trust volumetric pipette standard solution transfer. Weigh the aliquot of the standard taken. This can be easily calculated provided the density of the standard solution is known. There are too many possible pipetting errors to risk a volumetric transfer without checking the accuracy by weighing the aliquot.**

- **Uncap a stock standard solutions for the minimum time possible. This is to avoid transpiration concentration of the analytes as well as possible environmental contamination.**

- **Replace a stock standard solutions on a regular bases because of the changing concentration of the standard through container transpiration and the possibility of an operator error. A mistake may occur the first time stock standard solution is used or it may never occur with the probability increasing with use and time. In addition the transpiration concentration effect occurs whether the standard solution is opened used on not and increases with use and increased vapour space (transpiration rate is proportional to the ration of the circumference of the bottle opening to vapour space).**