# ATOMIC ABSORPTION ANALYTICAL TECHNIQUES

## *Sample Preparation:*

-A disadvantage of flame spectroscopic methods is the requirement that the sample be introduced into the excitation source in the form of a solution, most commonly an aqueous one.

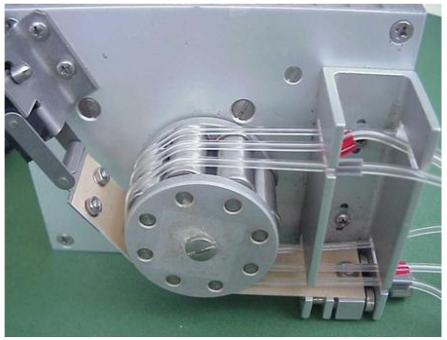
- Unfortunately, many materials of interest, such as soils, animal tissues, plants petroleum products and minerals are not directly soluble in common solvents, and extensive preliminary treatment is often required to obtain a solution of the analyte in a form ready for atomization.

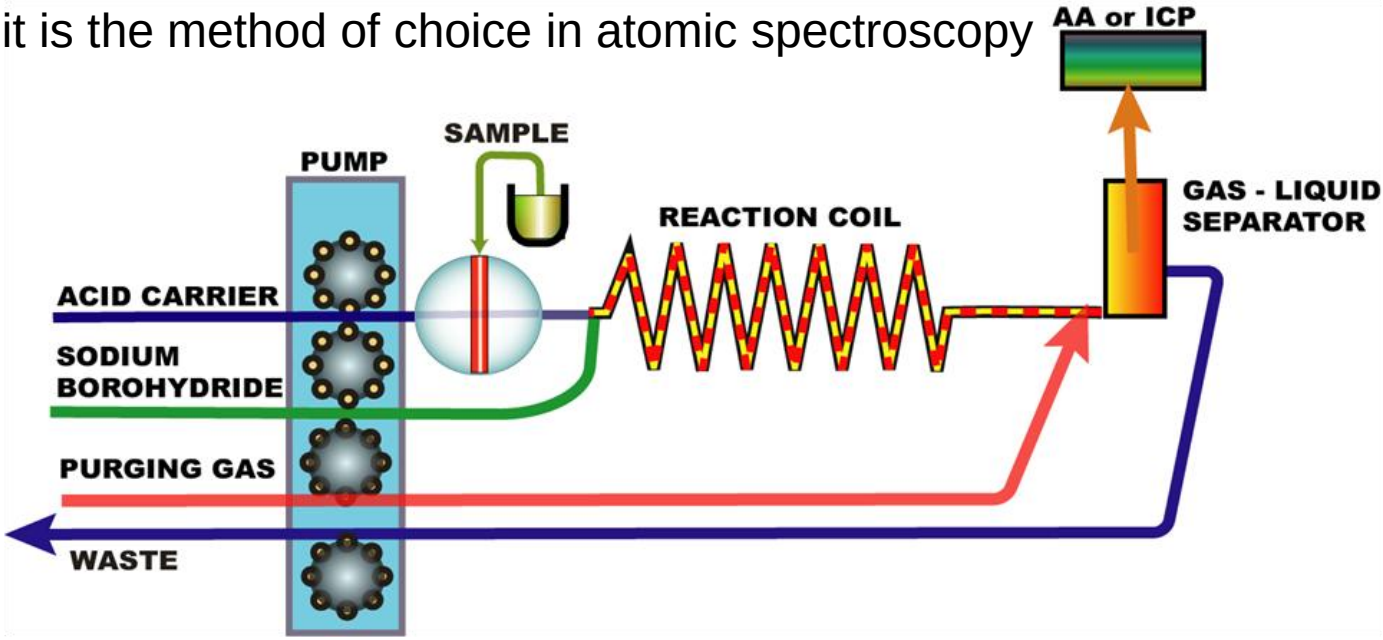
- Indeed, the decomposition and solution steps are often more time consuming and introduce more error than the spectroscopic measurement itself.

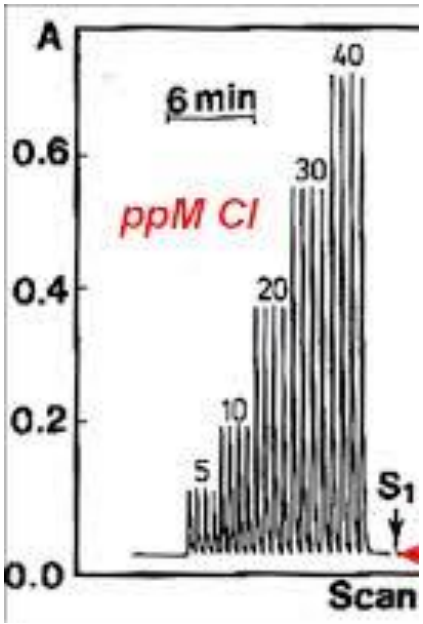
- Some of the common methods used for decomposing and dissolving samples for atomic absorption methods include treatment with hot mineral acids; oxidation with liquid reagents, such as sulfuric, nitric, or perchloric acids; combustion in an oxygen bomb or other closed container to avoid loss of analyte.

# *Sample Introduction by Flow Injection*

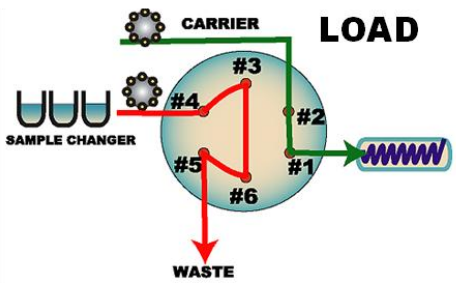
- FIA is an automated method of chemical analysis in which a sample is injected into a flowing carrier solution that mixes with reagents before reaching a detector.
- when the highest level *of repeatability* is required or only *a small amount of sample is available*, it is the method of choice in atomic spectroscopy

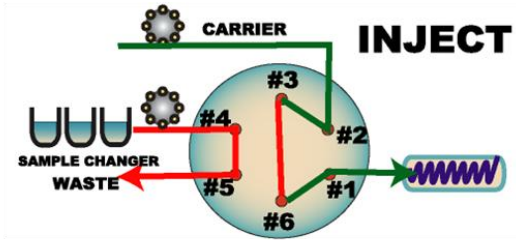


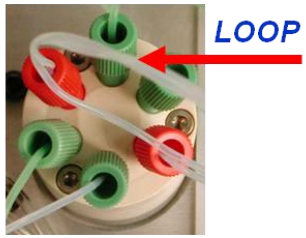



*A two position, six port injection valve with a fixed loop for well defined sample volumes*

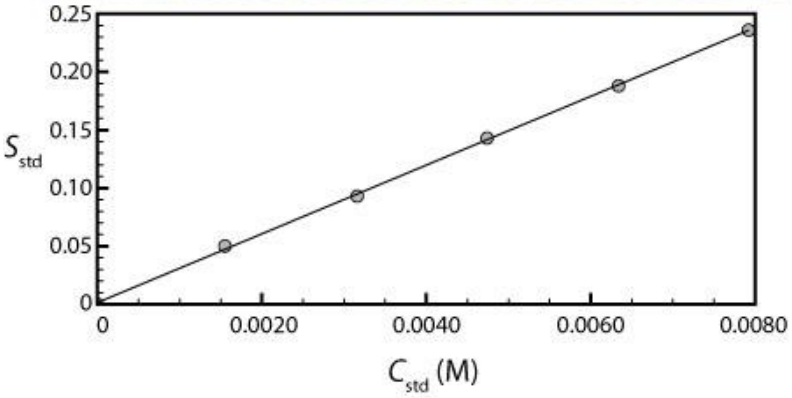


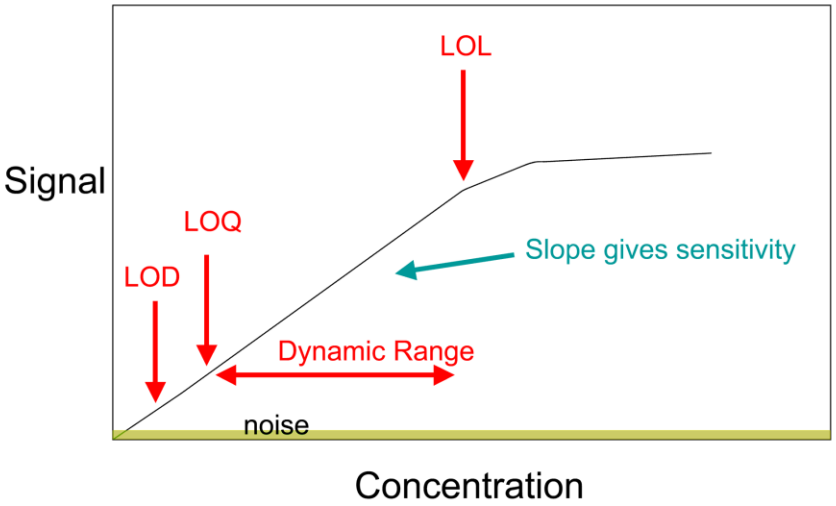



# Calibration Curve

- ✓ Atomic absorption should follow Beer's law, A= e. b. C
- ✓ however, departures from linearity are often encountered,
- ✓ A calibration curve that covers the range of concentrations found in the sample should be prepared.




A calibration curve plot showing limit of detection (LOD), limit of quantification (LOQ), dynamic range, and limit of linearity (LOL).

➢ *LOD is the lowest quantity of a substance that can be distinguished from the absence of that substance (a blank value) within a stated confidance limit*

➢ *LOD defined as 3 * standard deviation of the blank, and at the LOQ defined as 10 * standard deviation of the blank*

# *Standard Addition Method:*

➢It is widely used in atomic absorption spectroscopy in order to partially or completely compansate for the chemical and spectral interferences introduced by the sample *matrix.*

➢ *differing amounts of* standard is added directly to the same amount of aliquots of analyzed sample, diluted to a volume and analyzed at the wavelength of interest.

This process is also called spiking.