§7.3.1 Selection of Analytical Condition

一、Sensitivity

1. Sensitivity (S)

At certain concentration, the ratio of difference in A (ΔA) and the difference in concentration(or mass) (Δc or Δm) :

$$Sc = \Delta A/\Delta c \quad \text{or} \quad Sm = \Delta A/\Delta m$$

2. Characteristic Concentration

It is usually stated in terms of μg / mol / 1% Abs (or μg / g / 1%Abs). The determined element concentration Cc of $(IT-Is)/IT=100\%$, or 0.0044 absorption.

$$cc = 0.0044\Delta c / \Delta A \text{unit: } \mu g(\text{mol } 1\%)-1$$

3. Characteristic Concentration

$$mc = 0.0044\Delta m / \Delta A \text{unit: } g(\text{mol } 1\%)-1$$

二、Detection Limit

Under proper confidence limits, the smallest concentration or smallest quantity detected of determined element. Using approximately bland solution, the thrice standard deviation of absorptivity through repeated determination(10-20 times).

1. Flame method

$$CDL = 3Sb/S \text{unit: } \mu g{\cdot}mL-1$$

2. Graphite furnace method

$$mDL = 3Sb / Sm$$

Sb: Standard deviation

Sc (Sm) : Sensitivity of the determined element, namely slope of calibration curve.

三、Selection of Analytical Condition

1. Analysis line

Generally choosing the resonance line of determined element; when concentration is high, choosing a less sensitive line.

2. Width of pass band(width of slit)

If there is no interfering line(alkali or alkaline earth metals), a wider width can be chosen, otherwise(transition or rare earth metals), a narrower width can be chosen.

3. Current of hollow cathode lamp

If stable and enough emission, choose low current.

4. Flame

For different element, choose different flame.

5. Height of observation

Adjusting height of observation(height of burner head),so that light can pass through the flame range where concentration of the determined atom is the largest, thus the sensitivity and the stability are high.

Outline of this page: sensitivity, detection limit, analytical condition.

Thinking subject of this page: What analytical conditions need to be selected?

Thinking subject of this page: How many elements can be determined in AAS?