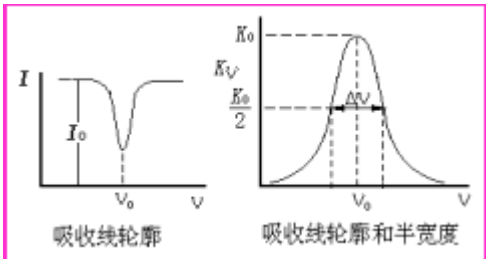
§7.1.4 Basic of Quantitative Analysis in Atomic Absorption Spectroscopy

Atomic absorption is quantified by an equation of the Lambert-beer's law:

$$I\lambda = I0\lambda \exp(-K\lambda b)$$

$K\lambda$ is the absorption coefficient that atomic vapor absorbs transimitted light at wavelengthλ.

1.The absorption $K\lambda$ varies great as wavelength (as shown in the right figure), so the



quantitative analysis can't be done according to the above equation.

2. Half width only occupies a few in a thousand, and it can't be recognized by instrument i.e.

the instrument can't produce pure single light (the single light be up to the mustarded) .

3.If frequency of emission line of source is the same as that of absorption line, and half Thus

width$\Delta V1/2$of emission line is less than of absorption line $\Delta V1/2$, as shown in the right figure.

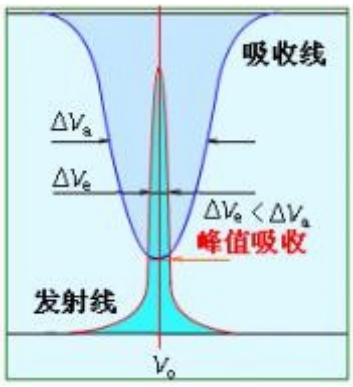
using sharp line source (i.e. the emitting light of sharp line source is regarded approximately

as a single light), the peak absorptivity may institute approximately absorptivity.

$$A = \lg \frac{I_0}{I_{tr}} = 0.434 \frac{2\sqrt{\pi \ln 2}}{\Delta v_D} \frac{e^2}{mc} f \cdot N \cdot b$$

then: $A = K0N0\ L$ .ordering

$$k = 0.434 \frac{2\sqrt{\pi \ln 2}}{\Delta v_D} \frac{e^2}{mc} f$$



The number of the total atoms N is approximately equal to the number of atoms at ground state. And the number of the total atoms $N$is directly proportion to the concentration of determined element

$$N0 \propto N \propto c$$

then: $A = \lg(I0/I) = K'c$

K' is a constant under a definite experimental condition, and c is the concentration of metal ion determined.

Outline of this page: The terms that peak absorption coefficient $K0$institutes absorption coefficient $K\lambda$

Thinking subject of this page: Why AAS can determine concentration of test metal ion in solution?

Thinking subject of next page: What is the difference in flow between atomic absorption spectrophotometers and ultraviolet visible spectrophotometers?