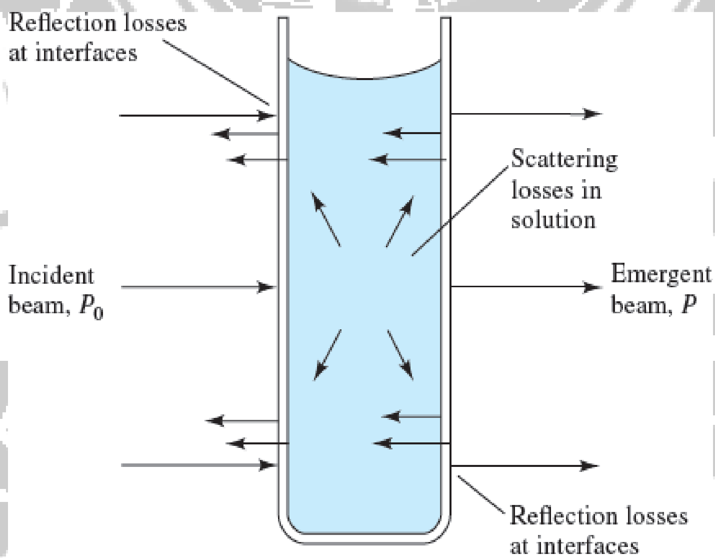
2.1 MOLECULAR ABSORPTION SPECTROMETRY

Molecular absorption spectroscopy in the ultraviolet and visible spectral regions is widely used for the quantitative determination of a large number of inorganic, organic, and biological species.

Transmittance and absorbance, as defined in Table above , cannot normally be measured directly in the laboratory because the analyze solution must be held in a transparent container, or cell.

Losses by reflection can occur at all the boundaries that separate the different materials. In this example, the light passes through the air-glass, glass-solution, solution-glass, and glass-air interfaces.

- As shown in Figure 13-1, reflection occurs at the two air-wall interfaces as well as at the two wall-solution interfaces.
- The resulting beam attenuation is substantial, where it was shown that about 8.5% of a beam of yellow light is lost by reflection in passing through a glass cell containing water.
- In addition, attenuation of a beam may occur as a result of scattering by large molecules and sometimes from absorption by the container walls.



- To compensate for these effects, the power of the beam transmitted by the analyte solution is usually compared with the power of the beam transmitted by an identical cell containing only solvent.
- An experimental transmittance and absorbance that closely approximate the

$$T = \frac{P_{\text{solution}}}{P_{\text{solvent}}} \approx \frac{P}{P_0}$$

$$A = \log \frac{P_{\text{solvent}}}{P_{\text{solution}}} \approx \log \frac{P_0}{P}$$

true transmittance and absorbance are then obtained with the equations