

## Experiment No.: 10

### To determine the dust particles in an air sample

Air borne particles are considered to be a nuisance to industries. They require clean air. Polluted atmosphere cause allergic asthma, bronchitis, emphysema and even fibrosis of lungs. Certain green plants are found to be good dust collectors rendering the air clean.

#### Apparatus required :

- 1) Four glass jars,
- 2) Suction pump,
- 3) Impactor device,
- 4) Weighing tube,
- 5) Analytical balance

#### Theory :

Sedimentation, the ability of particles to settle, is defined by relationship, called Stoke's law, allows the analyst either to predict relative settling velocities ( $V_1$ ) of various particles knowing their diameter ( $d$ ) or to compute diameter knowing the time in which a particular aerosol settled from a know elevation.

Assuming that the particles are spherical and that a constant buoyancy is exerted by air, then

$$d = \frac{18\eta V_1}{(d_p - d_f)g}$$

where,

$\eta$  = viscosity of air (poise)

$d_p$  = density of particles ( $\text{g/cm}^3$ )

$d_f$  = density of air ( $\text{g/cm}^3$ )

$g$  = acceleration due to gravity

It has been found that the actual settling ability of very small particles approaching molecular diameter is so small that, for

practical purposes, such particles remain suspended in air and even difficult to remove with rain fall.

## **Procedure & Calculation:**

### **1) Gravitational Method**

This method can be used to evaluate the dust fall within a city or in an industrial shed and usually it accounts for particles of 1 micron or of larger size.

- a. Put four clean glass jars of known open area in the atmosphere where dust fall is to be estimated.
- b. After a sufficient gap of time (some hours or days) collect the dust settled in each jar.
- c. Calculate the result of dust fall to be expressed as weight of dust per unit area per unit time.

## **Results:**