# SPECIFIC SURFACE AREA MEASUREMENT

## 1. Introduction

The specific surface area is a parameter in models for permeability and in the transport of a species that can adsorb on the mineral surfaces. The specific surface area is usually expressed as square meters of surface per gram of solid($cm^2$/g veya $m^2$/kg).

As the material is defined, the particle size, particle shape, the liberalization size parameters and specific surface area are used. Knowing specific surface area in chemical process, flotation, drying and filtration is significant. Thespecificsurfacearea is increased as theparticle size is reduced. Andthespecificsurfacearea is alsoincreasediftheparticle has pores.

### Specific Surface Area Measurement Methods

Specific surface area can be measured in different ways as follows:

1. Permeability
    a) Liquid or gas flow
    b) Change of gas flow
    c) Low pressure gas flow
2. Adsorption Methods
    a) Gas adsorption on solid surface
    b) Adsorption of dye solution
3. Radiation Methods
4. TheSize Distribution Functions
5. Measurements of Particle Projection Optically

### Specific Surface Area Measurement Devices

In the used devices, air flow resistance is measured and the measurements are calculated with KOZENY CARMAN equation.

1. Sub sieve- sizer device
2. Blaine device
3. Friederich permeability device

## 2. Experimental Studies

**Purpose:** Measurement specific surface area of fine-sized sample.

**Device:** SHIMADZU SS-100

**Particle size:** 500-100 μm

**Method:**The percentage of air permeability of the sample at constant pressure.

**Preparation of experiment sample:** The sample is put in the measurement cup. In the measurement cup, sample thickness is foundthrough scale on piston. After the sample is pressed, sample thickness must be 5-15 mm (L). Cross sectional area of sample bearing is 2 $cm^2$. The sample should be weighted nearly its specific gravity in experiments.

In experiment;

- B valve is closed and A valve is opened. Then, the water is added to water chamber up to 's' level on glass tube.
- The sample in the measurement cup is placed on the device carefully.
- B valve is opened.
- t is determined with changing quantity of gas passing from inside of sample
- The differential pressure between the two surfaces of the sample bearing(ΔP) is read through scale.ΔP is changed between 10 and 60 $g/cm^2$.

**Calculation of the specific surface area**

Specific surface area is calculated with KOZENY- CARMAN equation.

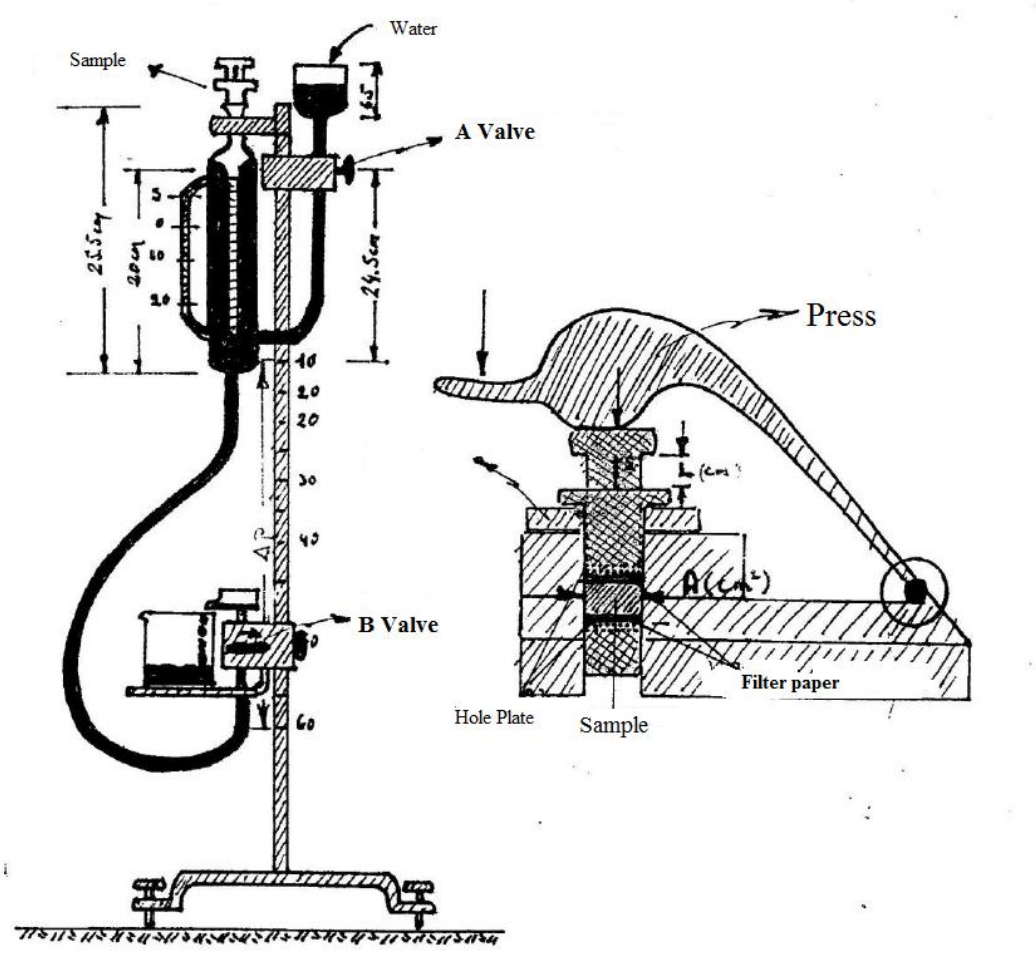
$$S_w = \frac{14}{\delta}\sqrt{\frac{\Delta P.A.t.e^3}{\eta.L.Q.(1-e)^2}}\ \text{cm}^2/\text{g} \qquad e = 1 - \frac{W}{\delta.A.L}$$

| | | |
|---|---|---|
| $S_w$ | : Specific surface area of sample | ($cm^2/g$) |
| e | : Porosity of sample | |
| W | : Weight of sample | (g) |
| L | : Height of sample bearing | (5-15 mm) |
| A | : Cross sectional area of sample bearing | (2 $cm^2$) |
| η | : The viscosity of liquid or solid | (0,000183poisse) g/cm.s |
| Q | : The amount of gas passing from inside of sample | (0-20 $cm^3$) |

ΔP :The differential pressure between the two surfaces of the sample bearing (10-60 g/cm$^2$)

t : Q quantity of gas passing time through the sample

δ : Specific gravity of sample (g/cm$^3$)




SHIMADZU SS- 100