Introduction:

*objectives*

determine the fineness of Portland cement in terms of the specific surface expressed as total surface area in square centimetres per gram of cement.

*advantages and disadvantages*

*the fineness of cement has advantages and disadvantages:

1- advantages: when the fineness of cement increase the specific surface increase which means that the total surface area of the cement increase and the hydration will be faster and give more strength of the cement.

2- disadvantages:
** the reaction will give us a huge amount of heat.
** this heat makes cracks in the construction.
** more fineness the cement be it will cost more money in many ways.
** the moisture has bad effects on the cement and make it solid.

(to solve these problems the ASTM make standard value min (2800 cm²/g).

DEFINITIONS:

Specific gravity (the total surface area for cement in square centimeters per gram (cm²/g))
Equipments: (blain air permeability apparatus)

The apparatus is supplied with glass U-tube manometer with valve, steel stand, test cell with disk (30-40) hole and plunger all in stainless steel, rubber aspirator bulb, filter paper disk, manometric liquid, funnel, cell grease, small brush, thermometer, accessories.

**MANOMETER**  
**CELL**  
**PLUNGER**

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**PERFORATED DISCK**  (30-40) HOLES

**FILTER**

1mm holes (discck)
**Procedure:**

1- we measured the cement sample it must be 2.8 g the standrd weight.

2- First we put the perforated disk in the cell then the filter then the cement sample finally we put another filter to prevent the cement to went out and we compress good.

3- We close the cell with the plunger tightly.

4- We put oil on the outer surface of the cell that touche the manometer in order to prevent any air to come out.

5- We open the valve of the manometer and pull out some air till the oil reach the mark no.1 or higher then we close the valve.

6- We wait till the oil mark reach to no.2 at once we open the stop watch.

7- When the oil reaches the mark no.3 we stop the time and record the total time that take from 2 to 3.

**Operation idea:**

The rate of air flow through the cement sample.
Calculations:

\[ S = S_s \sqrt{T/T_s} \]

\[ T_s = 70 \text{ sec} \]
\[ S_s = 3770 \text{ cm}^2/\text{g} \]

\[ T: \text{time interval of manometer drop for test sample (sec).} \]
\[ S: \text{specific surface of test sample (cm}^2/\text{g).} \]

With respect that the temperature is constant
BLAINE AIR PERMEABILITY APPARATUS