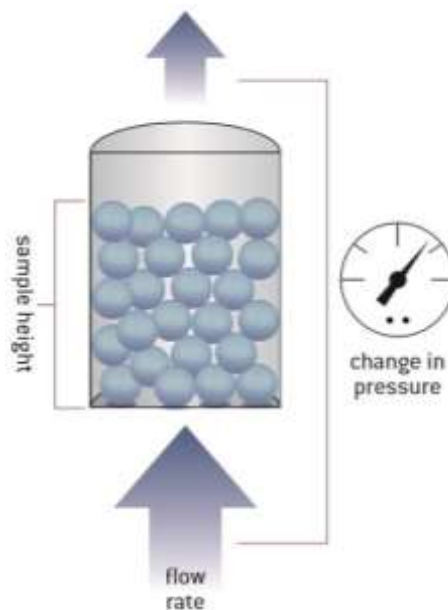


Blaine Test



General Features

Blaine testing machine or SSA (Specific Surface Area) is a dry-powder particle size analyzer. Employing the principle of Air Permeability, this machine is simple to operate and produces quick results for a range of powders in the 0.2–75 micron range. This is a generational update on the venerable Fisher model, which has seen service in the concentrate, cement, and other industries since its development. The water manometers and manual rack-and-pinion systems have been replaced with modern gas control devices and a servo-controlled ball-screw assembly. The system is automated through a touch-screen interface with an intuitive menu interface.



System Features

In this machine, efforts have been made to measure the specific surface. The system is fully self-contained and the only utilities required is a single power supply. Airflow is generated via an integrated bellows pump. Highly accurate

mechanical compression is delivered by a ball screw piston that driven by a servo motor. Gas control is provided by a Calibrated Mass Flow Controller (MFC).

User serviceable components and calibration controls are accessible via a side door on the left of the instrument. Storage of spare sample tubes and plugs can be accommodated within the side compartment. The airflow from the pump is transferred through the drying tube to the Brooks gas mass flow controller to the anvil spigot (and hence the sample), Then, it is transferred from the top of the piston to the metering valve and out to the atmosphere. Along with the high sensitivity, the machine is designed to be operated easily, to perform the tests with minimum operating skill, receive data, also to process and conduct the test with the highest power. The equipment consists of a Sample Tube, Piston, Ball screw, Servo Motor, Meter Valve, MFC, Pump etc.

Test Methods

This machine supports both test methods that can be carried out on the Fisher and SSA the varying porosity method used in the pharmaceutical and the fixed torque method (based on ASTM B330-07 and ISO 10070) typically is used in the concentrate and metal powders industries. In this machine user interface, the varying porosity method is referred to as the organics test method and the fixed torque method is referred to as the inorganics test method. The first thing that when the device turns on for the first time does is to check the set pressure. This should only is done a few times per month. The airflow pressure must be between 45 and 55 cmH₂O. Initially, the position of the needle valve is adjusted to give a constant inlet pressure to 50 cmH₂O and subsequently checked that it stays between 45 and 55 cmH₂O. Ensure that the real density for the material has been inputted along with the correct sample mass (that was charged to the sample tube).

This is vital to obtaining valid data. The true density of the particles that consist of a powder or particulate solid, in contrast to bulk density, which measures the average density of a large volume of the powder in a specific medium (usually air) i.e. it is the actual density of the material that consists of the powder without void space.

Derivation Of Air-Permeability Mathematics

The technique employs the principle of Air-Permeability and the work of P.C Carmen. This theory relates the Specific Surface Area (Surface Area per Unit Mass) to pressure drop developed by passing airflow through a packed bed of known porosity. The porosity is the percentage of void space in the bed and describes the degree of compression of the powder. For a given “Porosity”, particle size is determined by measuring the flow rate and pressure drop across the bed. The relationship between a characterized fluid flow through a bed of packed powder and the specific surface area of that powder is given by the Kozeny-Carmen equation:

$$SSA = \frac{7d}{\rho(1 - \varepsilon)} \sqrt{\frac{\varepsilon^3 \pi \Delta P}{lQ\eta}}$$

Instrument specifications

Specification	
Physical	
Height	50 Cm
Width	55 Cm
Depth	60 Cm
Weight	40 Kg
Porosity Range	0.2- 0.9
Size Range	0.5-75 micron

Advantages of Blaine test

- Easy to operate and user friendly
- Reduced time of testing Blaine or specific surface area
- No need for water manometers
- Ability to measure Blaine, porosity, and particle diameter based on Fisher method and SSA method
- Easy to calibrate the device
- Analytical validation in the Blaine range ± 40
- Calibration certificate for device performance from reputable authorities