



19FTB203 - ENGINEERING PROPERTIES OF FOOD MATERIALS

QUESTION BANK – INTERNAL 1

Short Answer Type :

1. What do you mean by porosity?

Porosity or void fraction is a measure of the void (i.e. "empty") spaces in a material, and is a fraction of the volume of voids over the total volume, between 0 and 1, or as a percentage between 0% and 100%. The term porosity is used in multiple fields

including pharmaceuticals, ceramics, metallurgy, manufacturing, hydrology, earth sciences, soil mechanics, and engineering.

2. Define volume

A volume is simply defined as the amount of space occupied by any three-dimensional solid. These solids can be a cube, a cuboid, a cone, a cylinder or a sphere. Volume of a solid is measured in cubic units.

3. What are the major engineering properties of food materials?

Physical properties : size & shape, density & specific gravity, volume, porosity, surface area

Thermal properties: Specific heat, thermal conductivity, thermal diffusivity, methods of determination, steady state and transient heat flow.

Electrical properties : Dielectric loss factor, loss tangent, A.C.

4. Define density

Density is one of the most important mechanical properties and so is widely used in process calculations. It is defined as mass per unit volume. The SI unit of density is kg/m³. True density (ρ_T) is the density of a pure substance or a composite material calculated from its components' densities considering conservation of mass and volume.

5. Define roundness

Roundness is defined as the ratio of the surface area of an object to the area of the circle whose diameter is equal to the maximum diameter of the object

6. Define sphericity

Sphericity is a measure of how closely the shape of an object resembles that of a perfect sphere. For example, the sphericity of the balls inside a ball bearing determines the quality of the bearing

7. Effect of moisture content on angle of repose

The angle of repose increased as moisture content of the grains increased. Angle of repose is a characteristic related to interparticle friction or resistance to movement between particles. The angle of repose is the angle with horizontal at the materials will stand when piled. The angle of repose, or angle with a horizontal surface formed when free-flowing grain comes to rest, can be used to estimate the height or width of grain piles. Angle of repose depends on properties like size and shape of kernels, moisture content, fines and foreign material content, presence of mold, and submerging, pouring, pilling or emptying method, and can vary greatly. The moisture content of food grains and other agricultural products play an important role in maintaining the desirable quality of product.

8. How to measure the angle of repose of food materials ?

The angle of repose can range from 0° to 90° (for a solid-like material). Its value is influenced by the interparticle forces (Van der Waals, Capillary, Electrostatic and Contact forces). The angle of repose is determined by either tilting box, fixed funnel, revolving cylinder, or hollow cylinder methods, in all of which the containers are filled with a sample and gradually lifted up, allowing the sample to accumulate and form a conical heap on the surface.

9. Conduction. Convection & radiation

Conduction is the transfer of thermal energy through direct contact.

Convection is the transfer of thermal energy through the movement of a liquid or gas.

Radiation is the transfer of thermal energy through thermal emission.

10. Usage of vernier calliper & screw gauge.

Vernier caliper	Screw gauge
It's least count is 0.01mm	Least count of screw gauge is 0.001mm
It is used to measure internal measurements like depth, etc of an object	It can be used to measure only thickness of sheets externally
It has 2 scales main scale and Vernier scale	It has a circular scale and a main scale
It is less precise compared to screw gauge	It is more precise

It is comparatively less accurate	It is more accurate
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11. Principle of size reduction.

Size reduction is a mechanical process of breakdown of solids into smaller size particles without altering the state of aggregation of solids. Many solid materials exists/present in sizes that are too large to be used directly. Thus such material must be reduced in size before use.