Df = 09/01/20

As we know that the particle shape and size is not regular or a symmetrical so it may be different types like either spherical smooth, spherical rough, spherical irregular, rounded and elongated irregular, angular, dendritic.

⇒ There are some factors which to be added along with projected diameter for expression of surface area and volume.

⇒ This factors are α_s for surface area factor & α_v for volume factor.

Property	Sphere	particle
Surface area	πd_s^2	$\alpha_s \times d_p^2$
volume	$\frac{1}{6}\pi d_s^3$	$\alpha_v d_p^2$

$$\alpha_s = \frac{\pi d_s^2}{d_p^2} \quad \{\text{when } d_s = d_p\}$$

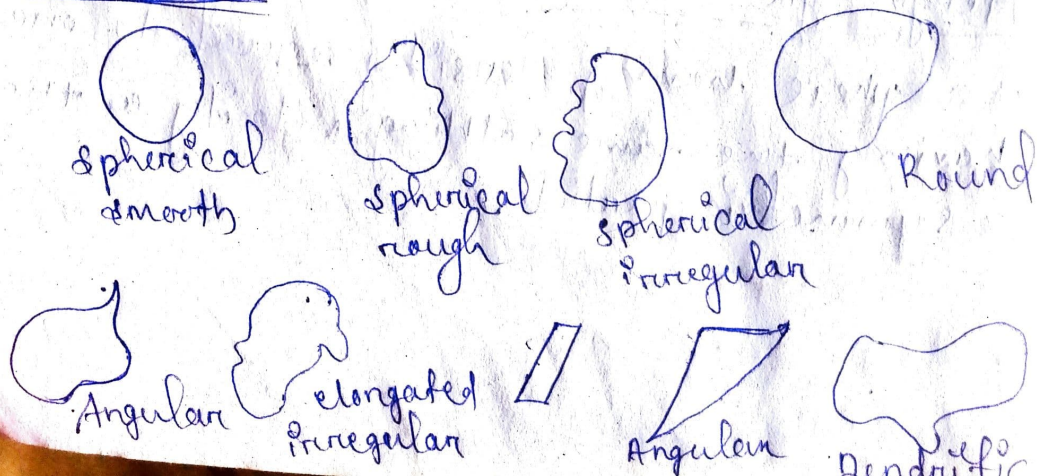
$$\alpha_v = \frac{\pi d_s^3}{6 d_p^3}$$

$$\alpha_s = \pi = 3.1241$$

$$\alpha_v = \frac{\pi}{6} = 0.5241$$

$$\text{shape factor} = \frac{\alpha_s}{\alpha_v} = \frac{\pi}{\pi/6} = 6$$

Particle shape :—



Specific surface :-

specific surface is defined as the surface area per unit ~~area~~ weight i.e S_w or surface area per unit volume. S_v

Estimation S_v :-

$$S_v = \frac{\text{Surface area of particles}}{\text{volume of particles}}$$

$$= \frac{\text{no of particles} \times \text{surface area of each particle}}{\text{No of particle} \times \text{volume of each particle}}$$

$$\Rightarrow \frac{n\alpha_s d^2}{n\alpha_v d^3} = \frac{\alpha_s}{\alpha_v . d}$$

As we know, $\frac{\alpha_s}{\alpha_v} = 6$ (six) ; $\boxed{S_v = \frac{6}{d}}$

Estimation of S_w

$$S_w = \frac{\text{surface area}}{\text{weight}}$$

$$= \frac{\text{surface area}}{\text{density} \times \text{volume}}$$

$$= \frac{n\alpha_s d_{vs}^2}{n\alpha_v d_{vs}^3 \times \rho} = \frac{\alpha_s}{\alpha_v \times d_{vs} \times \rho}$$

$$\Rightarrow \boxed{S_w = \frac{6}{\rho \times d_{vs}}}$$

The estimat^n of specific surface S_w and S_v of griscio where the particle assuming to be spheres having $d_{vs} = 3.0\,\mu m$ and density = 1.455 gm/cm^3.

$$A_{vs} = \frac{6}{1.455 \times 3.0 \times 10^{-4}} = \cancel{12.371\,\mu m}$$

$$\cancel{S_v = \frac{6}{d}}$$

$$d_{vs} = 3.0 \times 10^{-4} \text{ cm}$$

$$S_w = \frac{6}{1.455 \times 3.0 \times 10^{-4}}$$

$$= 1.374 \times 10^{4} \text{ cm}^2/\text{gm}$$

$$S_v = 2 \times 10^{4} \text{ cm}^2/\text{cm}^3$$