

Answer on Question 61592, Physics, Other

Question:

Fine grains of beach sand are assumed to be spheres of radius $52.3 \mu\text{m}$. These grains are made of silicon dioxide which has a density of 2600 kg/m^3 . What is the mass of each grain of sand? Answer in units of kg .

Solution:

By the definition of the density we have:

$$\rho = \frac{m}{V},$$

here, ρ is the density of the grain of sand, m is the mass of each grain of sand and V is the volume of the grain of sand.

Then, from this formula we can find the mass of each grain of sand:

$$m = \rho V.$$

We know, that fine grains of beach sand are assumed to be spheres, thus we need to use the formula for the volume of the sphere:

$$V = \frac{4}{3}\pi r^3,$$

here, r is the radius of the sphere.

Finally, we can find the mass of each grain of sand:

$$m = \rho V = \frac{4}{3}\pi \rho r^3 = \frac{4}{3} \cdot \pi \cdot 2600 \frac{\text{kg}}{\text{m}^3} \cdot (52.3 \cdot 10^{-6} \text{ m})^3 = 1.56 \cdot 10^{-9} \text{ kg}.$$

Answer:

$$m = 1.56 \cdot 10^{-9} \text{ kg}.$$