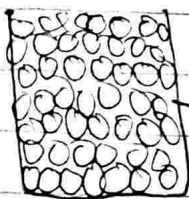


u. Limestone (calcium carbonate) particles are stored in 50-l bags. The void fraction of the particulate matter is 0.30 (liter of void space per liter of total volume) and the specific gravity of solid calcium carbonate is 2.93.

(a.) Estimate the bulk density of the bag contents (kg of CaCO_3 /liter of total volume).

(b.) Estimate the weight (W) of the filled bags. State what you are neglecting in your estimate



Void fraction = 0,3 liter void / 1 liter total volume

a.

Jadi dalam karung 50 liter, Void volume = $50 \times 0,3 = 15$ liter.

Volume CaCO_3 saja = $50 - 15 = 35$ liter

Diambil ρ ref air pada suhu 4°C sebesar 1 g/cm^3

$$SG = \frac{\rho}{\rho_{ref}}$$

$$2,93 = \frac{\rho}{1 \text{ g/cm}^3}$$

$$\rho = 2,93 \text{ g/cm}^3$$

massa CaCO_3 saja $M = \rho \cdot V$

$$= 2,93 \cdot 35000$$

$$= 102550 \text{ gram}$$

$$M = 102,55 \text{ kg}$$

$$\rho_{bulk} = \frac{m}{V + V_{void}}$$

$$= \frac{102,55 \text{ kg} \times 1000 \frac{\text{liter}}{\text{m}^3}}{50 \text{ liter}}$$

$$\rho_{bulk} = 2051 \frac{\text{kg}}{\text{m}^3} \text{ (isi karung)}$$

b. Dianggap $g = 9,8 \text{ m/s}^2$, massa karung = 1 kg, udara tidak bermassa

$$w = (m + m_{\text{karung}}) \cdot g$$
$$= (102,55 + 1) \text{ kg} \cdot 9,8 \frac{\text{m}}{\text{s}^2}$$

$$w = 1014,79 \text{ N}$$