

# Analyse dimensionnelle

# fat maname

① Force dans des N

$$N = \mu \times \rho \times S$$

$$\begin{matrix} N \\ \swarrow \\ \text{kg} \cdot \text{m} \cdot \text{s}^{-2} \end{matrix}$$

$$\begin{matrix} \text{kg} \cdot \text{m}^{-3} \\ \downarrow \\ [\text{M}] [\text{L}]^{-3} \end{matrix}$$

$$\begin{matrix} \text{m}^2 \cdot \text{s}^{-2} \\ \swarrow \\ \text{m}^2 \end{matrix}$$

②  $F = V \times \mu \times g$

$$\begin{matrix} F \\ \swarrow \\ \text{kg} \cdot \text{m} \cdot \text{s}^{-2} \end{matrix}$$

$$\begin{matrix} \text{m}^3 \\ \downarrow \end{matrix}$$

$$\begin{matrix} \text{kg} \cdot \text{m}^{-3} \\ \downarrow \end{matrix}$$

$$\begin{matrix} \text{m}^2 \cdot \text{s}^{-2} \\ \downarrow \end{matrix}$$

$$= \text{kg} \cdot \text{m} \cdot \text{s}^{-2}$$



③  $E = h \cdot \omega$

$$\begin{matrix} E \\ \swarrow \\ \text{kg} \cdot \text{m}^2 \cdot \text{s}^{-2} \end{matrix}$$

$$\begin{matrix} \text{kg} \cdot \text{m}^2 \cdot \text{s}^{-2} \\ \downarrow \end{matrix}$$

$$1 \text{ g/cm}^3 = 10^3 \text{ kg/m}^3$$

Mise en situation

$$F = V \mu g$$

$$V = \frac{F}{\mu g} = \frac{0,196}{1000 \times 9,81}$$

$$m = 300 \text{ g}$$

$$p_{\text{eau}} = 0,196 \text{ N}$$

$$\rho_{\text{or}} = 19,5 \text{ g} \cdot \text{cm}^{-3}$$

$$\rho_{\text{arg}} = 10,5 \text{ g} \cdot \text{cm}^{-3}$$

$$F = V \times \mu \times g$$

$$0,196 = V \times ($$

$$\begin{aligned} &= \frac{0,196}{1000 \times 9,81} \\ &= 1,99 \times 10^{-5} \text{ m}^3 \\ &= 2 \times 10^{-5} \text{ m}^3 \\ &= \boxed{20 \text{ cm}^3} \end{aligned}$$

$$\frac{m_{\text{or}}}{M_{\text{tot}}} \times 100 =$$

$$\rho_{\text{eau}} = \frac{M_{\text{eau}}}{V_{\text{eau}}}$$

$$\rho_{\text{arg}} = \frac{M_{\text{arg}}}{V_{\text{arg}}}$$

$$\begin{cases} V_{\text{or}} \times \rho_{\text{or}} + V_{\text{arg}} \times \rho_{\text{arg}} = M \\ V_{\text{or}} + V_{\text{arg}} = V_{\text{tot}} \end{cases}$$

$$(20 - V_{\text{arg}}) 19,5 + V_{\text{arg}} \times 10,5 = 300$$

$$V_{\text{or}} = 20 - V_{\text{arg}}$$

$$\begin{cases} V_{\text{or}} \times 19,5 + V_{\text{arg}} \times 10,5 = 300 \\ V_{\text{or}} + V_{\text{arg}} = 20 \end{cases}$$