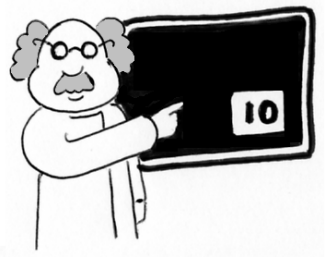


STARTER FOR 10...

0.2.3. Quantity calculus (unit determination)

1. Determine the units of density given that

$$density = \frac{mass(g)}{volume\ (cm^3)}$$

(1 mark)

2. Determine the units of concentration given that

$$concentration = \frac{number\ of\ moles\ (mol)}{volume\ (dm^3)}$$

(1 mark)

3. Pharmacists often calculate the concentration of substances for dosages. In this case the volumes are smaller, measured in cm^3, and the amount is given as a mass in grams. Determine the units of concentration when

$$concentration = \frac{mass\ (g)}{volume\ (cm^3)}$$

(1 mark)

4. Rate of reaction is defined as the *'change in concentration per unit time'*. Determine the units for rate when concentration is measured in mol dm^{-3} and time in seconds.

(1 mark)

5. Pressure is commonly quoted in pascals (Pa) and can be calculated using the formula below. The SI unit of force is newtons (N) and area is m^2.

$$pressure = \frac{force}{area}$$

Use this formula to determine the SI unit of pressure that is equivalent to the Pascal.

(1 mark)

6. Determine the units for each of the following constants (K) by substituting the units for each part of the formula into the expression and cancelling when appropriate. For this exercise you will need the following units [ ] = mol dm^{-3}, rate = mol dm^{-3} s^{-1}, p = kPa.

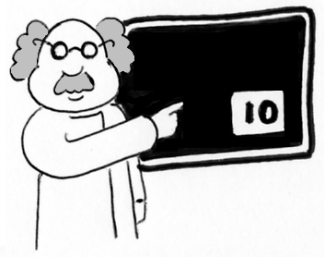
a. $K_c = \frac{[A][B]^2}{[C]}$

b. $K = \frac{rate}{[A][B]}$

c. $K_p \frac{(pA)^{0.5}}{(pB)}$

d. $K_w = [H^+][OH^-]$

e. $K_a = \frac{[H^+]\,[X^-]}{[HX]}$



STARTER FOR 10...

0. TRANSITION SKILLS Answers

2. a. 180 *(1 mark)*

b. 5352 *(1 mark)*

c. 180 *(1 mark)*

Evaluation: Pressing equals after each operation leads to BODMAS errors. *(1 mark)*

0.2.3. Quantity calculus

1. $g\ cm^{-3}$ *(1 mark)*

2. $mol\ dm^{-3}$ *(1 mark)*

3. $g\ cm^{-3}$ *(1 mark)*

4. $mol\ dm^{-3}\ s^{-1}$ *(1 mark)*

5. $N\ m^{-2}$ *(1 mark)*

6. a. $mol^{2}\ dm^{-6}$ *(1 mark)*

b. $mol^{-1}\ dm^{3}\ s^{-1}$ *(1 mark)*

c. $kPa^{-0.5}$ *(1 mark)*

d. $mol^{2}\ dm^{-6}$ *(1 mark)*

e. $mol\ dm^{-3}$ *(1 mark)*