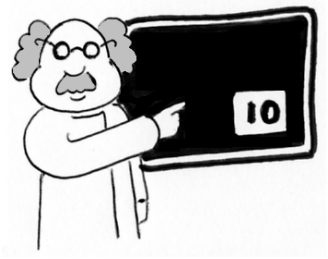

STARTER FOR 10...

1.2. The ideal gas equation

The following balloons **all contain 10 g** of gas. Calculate the number of moles of each gas in the balloon and complete the conditions each balloon must be under ($R = 8.314$ J K^{-1} mol^{-1})

(1 mark for each correct answer)

Hydrogen

No. of moles of hydrogen present; _____ moles

Pressure; 107,000 Pa ∴ **Temperature**; _____ K

Volume; 2.1×10^{-2} m^3

Methane

No. of moles of methane present; ____ moles

Pressure; 73.3 kPa ∴ **Volume**; _____ m^3

Temperature; 353 K

Helium

No. of moles of helium present; _____ moles

Volume; 2.07 dm^3 ∴ **Pressure**; _____ Pa

Temperature; 373 K

Carbon dioxide

No. of moles of CO_2 present; _____ moles

Pressure; 149,000 Pa ∴ **Volume**; _____ m^3

Temperature; 64 °C

Chlorine

No. of moles of chlorine present; _____ moles

Volume; 35,000 cm^3 ∴ **Temperature**; _____ °C

Pressure; 89 kPa

1.1.4. Moles summary

1. (a) 1 mole × (correct answer, 0.5 moles)

(b) 1 mole ✓

2. (a) $K + 2 H_2O \rightarrow K(OH)_2 + H_2$ × (correct answer; $2 K + 2 H_2O \rightarrow 2 KOH + H_2$)

(b) 0.075 moles ✓

3. (a) 22.5 g ✓

(b) 249.6 g × (correct answer; 49.9 g)

4. (a) 0.5 moles ✓

(b) 64 g × (correct answer; 128 g)

5. (a) 5×10^{-3} moles ✓

(b) 93.8 cm^3 ✓

1.2 The ideal gas equation

Hydrogen; 5 moles, 54 K

Methane; 0.625 moles, 0.025 m^3

Helium; 2.5 moles, 3,745 kPa

Carbon dioxide; 0.227 moles, 4.27×10^{-3} m^3

Chlorine; 0.141 moles, 2387 °C

1.3 Molar gas volume

Syringe A links with **syringe H**; no. of moles = 4.7×10^{-3} moles

Syringe B links with **syringe I**; no. of moles = 0.25 moles

Syringe C links with **syringe F**; no. of moles = 2.8×10^{-3} moles

Syringe D links with **syringe G**; no. of moles = 3.8×10^{-3} moles

Syringe E links with **syringe J**; no. of moles = 5.5×10^{-3} moles

1.4 Empirical and molecular formulae

Amino acid A has an empirical formula of $C_5H_{10}N_2O_3$ and is therefore **glutamic acid**

Amino acid B has an empirical formula of C_3H_7NO and is therefore **lysine**

Amino acid C has an empirical formula of $C_4H_8N_2O_3$ and is therefore **aspartic acid**

Amino acid D has an empirical formula of $C_4H_9NO_3$ and is therefore **threonine**

Amino acid E has an empirical formula of $C_3H_7NO_2$ and is therefore **alanine**