

Molar Gas Volumes - Answers

1. Calculate the volume of 0.01g of hydrogen at rtp.

$$\left(\frac{0.01}{2}\right) \times 24 = 0.12 \text{ dm}^3$$

2. Calculate the mass of 100cm³ of CO₂ at rtp.

$$\frac{(100/1000)}{24} \times 44 = 0.183 \text{ g}$$

3. Calculate the mass of 200cm³ of chlorine gas at rtp.

$$\frac{(200/1000)}{24} \times 71 = 0.592 \text{ g}$$

4. Calculate the density of argon at rtp.

$$\frac{40}{24} = 1.67 \text{ g dm}^{-3}$$

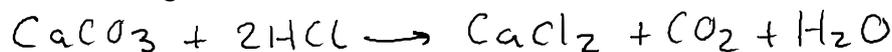
5. Calculate the volume occupied by 0.16g of oxygen gas at rtp.

$$\left(\frac{0.16}{32}\right) \times 24 = 0.12 \text{ dm}^3$$

6. If a gas has a density of 1.42gdm⁻³ at rtp, calculate the mass of 1mole of the gas.

$$1.42 \times 24 = 34.1 \text{ g}$$

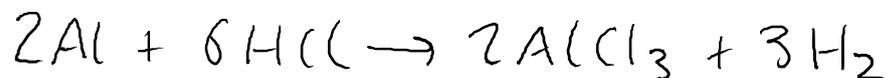
7. Calculate the volume of carbon dioxide evolved at rtp when an excess of dilute hydrochloric acid is added to 1.00g of calcium carbonate.



$$\text{CaCO}_3 = \text{Mr of } 100 \quad \left(\frac{1 \text{ g}}{100}\right) \times 24 = 0.24 \text{ dm}^3$$

1 : 1 ratio.

8. A student carried out an experiment in which she had to produce some hydrogen from the reaction between aluminium and excess dilute hydrochloric acid. In order to measure the volume evolved at rtp, she collected the hydrogen in a 100cm³ gas syringe. What is the maximum mass of aluminium she could have used so that she did not exceed the 100cm³ capacity of the gas syringe?



2 : 3 ratio between Al and H₂

If 1 mole of Al : 1.5 moles of H₂ so 1.5×24
 $= 36 \text{ dm}^3$ or
 $36000 \text{ cm}^3!$

so if $36 \text{ dm}^3 = 27 \text{ g of Al}$: $27 \times \left(\frac{100}{36000}\right) = \underline{\underline{0.075 \text{ g Al}}}$

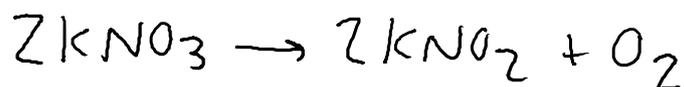
9. Chlorine can be prepared by heating manganese(IV) oxide with an excess of concentrated hydrochloric acid. What is the maximum volume of chlorine measured at rtp that could be obtained from 2.00g of manganese (IV) oxide?



$$\frac{2}{87} = 0.023 \text{ moles} - \text{also moles of Cl}_2.$$

$$0.023 \times 24 = 0.552 \text{ dm}^3$$

10. What mass of potassium nitrate would you have to heat in order to produce 1.00dm³ of oxygen at rtp.



$$\text{KNO}_3 \text{ Mr} = \underline{101}$$

$$1 \text{ mole} \div 2 \text{ ratio} = 0.5 \times 24 = 12 \text{ dm}^3$$

$$\therefore 101 \times \frac{1}{12} = \underline{\underline{8.416 \text{ g}}}$$