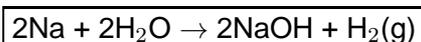




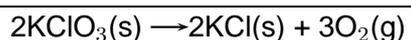
5 Worksheet: Mole concept and stoichiometric calculations

QUESTION 1

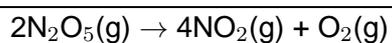
- 1.1 Calculate how many CO₂ molecules there are in 8,8 g gas.
- 1.2 Calculate what volume of a 0,3 mol.dm⁻³ oxalic acid solution contains 22,5 g oxalic acid ((COOH)₂).
- 1.3 Calculate the how many sodium atoms must react **completely** to give 33,6 dm³ hydrogen gas at STP.



- 1.4 What mass of KClO₃ must decompose **completely** to produce 3,36 dm³ of oxygen gas at STP?



- 1.5 Consider the following reaction:

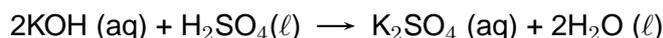


The reaction take place in a container where CONDITIONS ARE NOT STP! Calculate the volume N₂O₅ that must decompose completely to produce 9,64 dm³ nitrogen dioxide.

- 1.6 A standard sodium carbonate solution is prepared by dissolving 5,3 g of the crystals in 250 cm³ water. 25 cm³ of this solution neutralises 10 cm³ of a hydrochloric acid solution.
- Calculate the concentration of the sodium carbonate solution.
 - Write a balanced equation for the neutralisation reaction.
 - Calculate the concentration of the hydrochloric acid.

- 1.7 Eastern Cape 2015 Preperatory exam Question 7.2:

0,28 g of potassium hydroxide is dissolved in water and titrated against a solution of sulphuric acid. The end point is reached after adding exactly 20 cm³ of a sulphuric acid solution. The balanced equation for this reaction is:



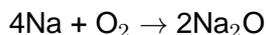
Calculate the concentration of the sulphuric acid solution. (5)



(The following questions focus on study material covered in Video 3)

QUESTION 2

2.1 Sodium burns in oxygen according to the following equation:



483 g sodium is placed in a container with 5,8 mol oxygen gas..

- Determine which substance acts as limiting agent. Show all calculations
- Calculate the mass of sodium oxide that can be produced.

2.2 Two solutions are mixed:

Solution	Volume (cm ³)	Concentration (mol·dm ⁻³)
H ₂ SO ₄	200	0,2
KOH	100	0,3

Calculate the pH of the solution.

(Hint: Determine the mole and concentration that is left over from the reactant that is in excess after the reaction.)

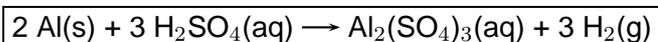
(The following questions focus on study material covered in Video 4)

QUESTION 3

3.1 $4\text{Al(s)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{Al}_2\text{O}_3\text{(s)}$

97,2 g Al reacts and produce 150 g aluminium oxide. Calculate the percentage yield.

3.2 In an experiment 8 g of unpure aluminium is added to an excess of sulphuric acid. The following reaction occurs:



The volume of H₂(g) that is produced is 6,72 dm³. Calculate the percentage purity of the aluminium.

3.3 An impure magnesium sample with mass 0,45 g reacts with 200 cm³ of a 0,2 mol·dm⁻³ nitric acid solution. The acids is in excess. The acid that remain is neutralised by 35 cm³ of a 0,2 mol·dm⁻³ sodium hydroxide solution. Calculate percentage purity of the magnesium sample.

