

AQA, OCR, Edexcel

GCSE Science

GCSE Chemistry

Yield and atom economy of
chemical reactions.

Answers

M M E

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Total Marks: /16

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Percentage Yield

Q1: Give three potential reasons, why it is not always possible to obtain the calculated amount of product from a reaction.

3 out of the 4.

1. A= The reaction may not go to completion because its reversible (1 mark)
2. A= Some of the product may be lost when it is separated from the reaction mixture (1 mark)
3. A= some of the reactants may react in ways different to the expected reaction (1 mark)
4. The product being in multiple states and difficult to measure.

(3 marks)

Q2: How is the amount of product produced quantified?

A= percentage yield (1 mark).

(2 marks)

Q3: Complete the following equation.

$$\%Yield = \frac{\text{Mass of product actually made (1 mark)}}{\text{Maximum theoretical mass of product (1 mark)}} \times 100$$

(2 marks)

Q4: Calcium oxide is reacted with water to form calcium hydroxide. If the theoretical yield is 3.0g, but only 1.4g is produced. What is the percentage yield?

$$1.4/3.0 = 0.46 \text{ (1 mark)}$$

$$0.46 \times 100 = 46\% \text{ (1 mark)}$$

(2 marks)

Atom Economy

Q5: What is atom economy?

A= A measure of the amount of starting materials that end up as useful products (1 mark)

(1 marks)

Q6: Why is it important to look at atom economy?

A= For sustainable development/ environmental reasons (1 mark) and economic reasons (1 mark).

(2 marks)

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Q7: Complete the equation for how atom economy is calculated.

$$\frac{\text{(Relative formula mass of desired product from equation)}}{\text{Sum of relative formula masses of all reactants from equation (1 mark)}} \times 100$$

(1 mark)

Using concentrations of solutions in mol/dm³

Q8: If 35g of NaCl is dissolved in water to a final volume of 3dm³. Calculate the concentration of the solution.

A= concentration = mass/ volume.

$$35/3 = 11.6\text{g/dm}^3 \text{ (1 mark)}$$

Number of moles = mass/ molar mass.

$$11.6/58.4 = 0.198 \text{ or } \underline{0.2\text{mol/dm}^3} \text{ (1 mark)}$$

(2 marks)

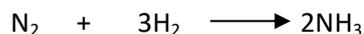
Use of amount of substance in relation to volume of gases

Q9: Equal amounts of gases in moles occupy the same volume under the same conditions of temperature and pressure. What is the volume of one mole of any gas at room temperature and pressure?

$$24\text{dm}^3$$

(1 mark)

Q10: Calculate the volume of ammonia that is produced from 300 cm³ of hydrogen.



$$200\text{cm}^3$$

(1 marks)