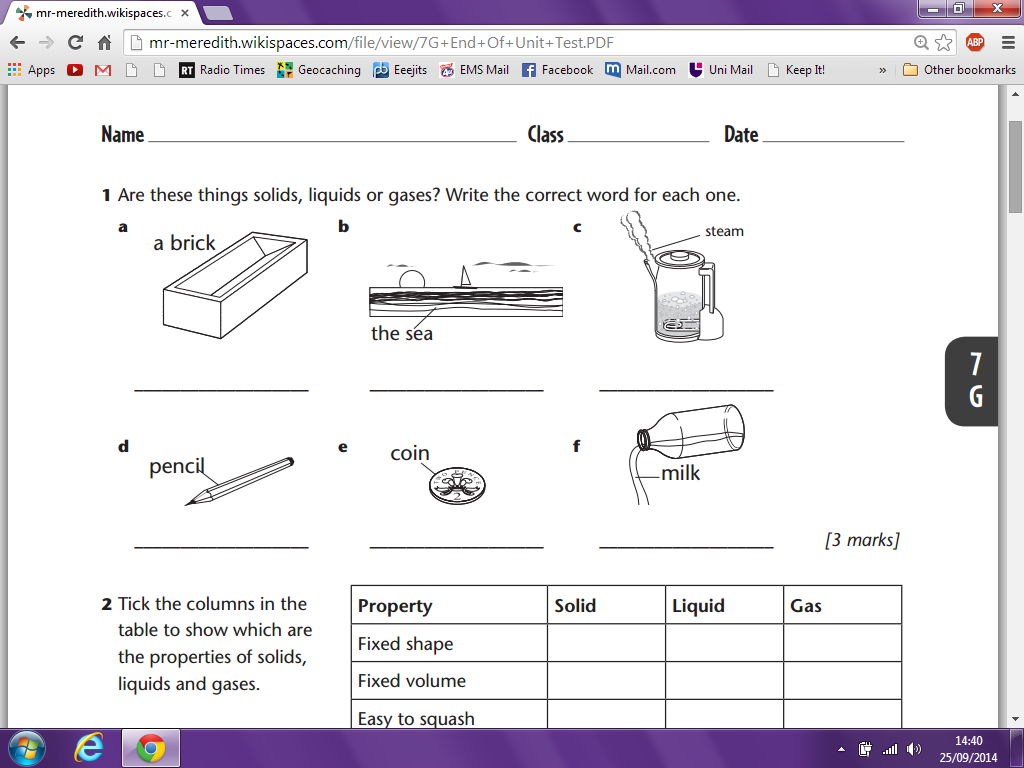


**English Martyrs’**

**Catholic School**

**C3 Quantative Chemistry Test**

**GCSE Foundation Tier**



**40 marks available**

**Answer all questions**

**40 minutes**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Section** | **Score** | **Areas to improve** | | | |
| **Relative Atomic and Formula Mass** | **/ 16** |  | | | |
| **Concentration of Solutions** | **/ 8** |  | | | |
| **Percentage Yield and Atom Economy** | **/ 16** |  | | | |
| **Total Marks** | **/ 40** | **Test**  **Grade:** |  | **Expected Grade:** |  |

**Relative Atomic and Formula Mass**

1. Calculate the relative **formula masses** of these substances:

**NaF** \_\_\_\_\_\_\_  **PH3 \_\_\_\_\_\_\_**

**AgNO3** \_\_\_\_\_\_\_  **H2O \_\_\_\_\_\_\_**

**C2O4H2 \_\_\_\_\_\_\_ Mg(OH)2 \_\_\_\_\_\_\_**

[6 marks]

1. In this reaction:

**C2H4 + H2 → C2H6**

What is the formula mass of: **C2H4** \_\_\_ , **H2**  \_\_\_ , **C2H6** \_\_\_

What do you notice about the mass of the reactants compared to the products? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[4 marks]

1. Calculate the relative formula mass (Mr) of iron sulfate Fe2(SO4)3

Relative atomic masses (Ar): oxygen = 16; iron = 56; sulfur = 32

Relative formula mass = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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[2 marks]

1. There are two isotopes of element A

Mass number of the isotope **6 7**

Percentage abundance **92.5% 7.5%**

Use the information in the Table above, to calculate the relative atomic mass of element A. Give your answer to 2 decimal places.

Relative atomic mass = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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[4 marks]

**Concentration of Solutions**

1. If 5g of lead nitrate is dissolved in 0.2 dm3 of solution, what is the concentration in g/dm3?
2. If 16g of sodium nitrite is dissolved in 4 dm3 of solution, what is the concentration in g/dm3?

[2 marks]

1. Convert the following volumes to dm3:
2. 2000cm3 = \_\_\_\_\_\_\_\_ dm3  b. 500cm3 = \_\_\_\_\_\_\_\_ dm3

[2 marks]

1. If 2.5g of potassium chloride is dissolved in 500 cm3 of solution, what is the concentration in g/dm3?
2. If 8g of copper bromide is dissolved in 250 cm3 of solution, what is the concentration in g/dm3?

[2 marks]

1. At 30 °C the solubility of sodium chloride is 36 kg per 100 dm3.

Calculate the minimum volume of water in dm3, at 30 °C, needed to dissolve

1989 kg sodium chloride. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Volume of water = \_\_\_\_\_\_\_\_\_ dm3

[2 marks]

**Percentage Yield and Atom Economy**

1. A reaction produces 30g of product, but in theory it could make a maximum of 120g. What is the percentage yield?
2. A reaction could produce a theoretical yield of 200g but only makes 150g. What is the percentage yield?
3. Very few chemical reactions have a yield of 100%.

List three reasons why:



[5 marks]

**Atom economy = Relative formula mass of desired product from equation × 100**

**Sum of relative formula masses of all reactants from equation**

1. In a reaction to produce SO3 gas, what is the atom economy of the following reaction?

**2SO2 + O2 → 2SO3**

* 1. Add up the Mr of all the reactants \_\_\_\_\_\_\_
  2. Calculate the Mr of the **useful** product \_\_\_\_\_\_\_
  3. Calculate the percentage atom economy \_\_\_\_\_\_\_%

[3 marks]

1. In a reaction to produce NaOH, what is the atom economy of the following reaction?

**2Na + 2H2O → 2NaOH + H2**

1. Add up the Mr of all the reactants \_\_\_\_\_\_\_
2. Calculate the Mr of the **useful** product \_\_\_\_\_\_\_
3. Calculate the percentage atom economy \_\_\_\_\_\_\_%

[3 marks]

1. Why is it important for sustainable development and for economic reasons to use reactions with high atom economy?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[2 marks]

1. The equation for the reaction of sodium carbonate and nitrate acid is:

**Na2CO3 + 2HNO3 → 2NaNO3 + H2O + CO2**

Relative formula masses: **Na2CO3** = 123.5; **HNO3**= 98.0; **NaNO3** = 85

Calculate the percentage atom economy for making sodium nitrate from sodium carbonate.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Atom economy = \_\_\_\_\_\_ %

[3 marks]

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