

C4.3 Mastery Quiz: Quantitative Chemistry

Section A

1. Calculate the relative formula mass (M_r) of FeBr_3 .

Relative atomic masses (A_r): Fe = 56 Br = 80

Tick (✓) **one** box.

[1]

A. 136

☐

B. 408

☐

C. 296

☐

2. Which ions do alkalis produce in aqueous solutions?

Tick (✓) **one** box.

[1]

A. H^+

☐

B. OH^-

☐

C. O^{2-}

☐

3. Acids react with alkalis. What is the name given to this type of reaction?

Tick (✓) **one** box.

[1]

A. Decomposition

☐

B. Electrolysis

☐

C. Neutralisation

☐

D. Redox

☐

4. Universal indicator turns purple when added to potassium hydroxide solution. Which is



likely to be the pH of potassium hydroxide solution?

Tick (✓) **one** box.

[1]

A. 1

☐

B. 7

☐

C. 14

☐

5. Below shows a chemical formula of a compound.



Choose the correct number of atoms in one molecule.

[1]

Tick (✓) **one** box.

A. 1 calcium atom, 1 carbon atom, 3 oxygen atoms

☐

B. 1 calcium atom, 3 carbonate atoms

☐

C. 3 calcium atoms, 3 carbon atoms, 3 oxygen atoms

☐

6. Choose the correct state symbol for an aqueous solution.

[1]

Tick (✓) **one** box.

A. (l)

☐

B. (s)

☐

C. (aq)

☐

7. Below shows a symbol equation of a chemical reaction.





When this reaction was carried out in a beaker on a balance, the mass decreased.

Choose the best explanation for why. [1]

Tick (✓) **one** box.

A. Carbon dioxide gas is produced which has no mass

☐

B. Carbon dioxide gas left the beaker

☐

C. Reactants always have a greater mass than the products formed

☐

8. Below shows an incomplete word equation for a chemical reaction.

Calcium carbonate + hydrochloric acid → carbon dioxide + _____ + water

Choose the missing substance. [1]

Tick (✓) **one** box.

A. Chlorine carbonate

☐

B. Calcium chloride

☐

C. Hydrocarbonate

☐

9. 200 g sodium hydroxide was dissolved in water to make 1 dm³ solution.

Choose the concentration of this sodium hydroxide solution. [1]

Tick (✓) **one** box.

A. 0.2 g/dm³

☐

B. 0.005 g/dm³

☐

C. 200 g/dm³

☐

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10. How many atoms are present in one mole of fluorine atoms?

Tick (✓) **one** box.

[1]

A. 19

☐

B. 2.06×10^{23}

☐

C. 6.02×10^{23}

☐

11. Convert 250 cm^3 to dm^3 .

Tick (✓) **one** box.

[1]

A. 250 dm^3

☐

B. 0.25 dm^3

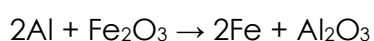
☐

C. 250000 dm^3

☐

12. A mixture contains 50 g of aluminium and 150 g of iron oxide.

The equation for the reaction is:



Which is the limiting reactant?

Relative atomic masses (Ar): O = 16 Al = 27 Fe = 56

Tick (✓) **one** box.

[1]

A. Aluminium

☐

B. Iron Oxide

☐

C. Iron

☐

13. Select the **correct** statement.

Tick (✓) **one** box.

[1]

- A. Ethanoic acid is a weak acid, because it partially ionises in an aqueous solution. ☐
- B. Sulfuric acid is a strong acid because it partially ionises in an aqueous solution. ☐
- C. Ethanoic acid is a strong acid because it fully ionises in an aqueous solution. ☐

14. Which of the following statements correctly describes a **concentrated** acid?

Tick (✓) **one** box.

[1]

- A. Little or no water molecules are mixed with the acid molecules. The concentration of H^+ ions is low. ☐
- B. Little or no water molecules are mixed with the acid molecules. The concentration of H^+ ions is high. ☐
- C. Many water molecules are mixed with the acid molecules. The concentration of H^+ ions is low. ☐

15. Ethanedioic acid ($\text{H}_2\text{C}_2\text{O}_4$) is a solid at room temperature.

Calculate the mass of ethanedioic acid equal to 0.048 moles.

Relative formula mass (M_r): $\text{H}_2\text{C}_2\text{O}_4 = 90$

Tick (✓) **one** box.

[1]

- A. 4.32 g ☐
- B. 0.0005 g ☐
- C. 1875 g ☐

Section B

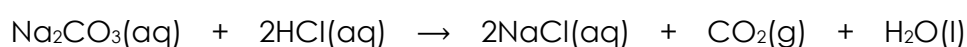


1. A student investigated the law of conservation of mass.

This is the method the student used.

1. Pour sodium carbonate solution into beaker A and pour hydrochloric acid solution into beaker B.
3. Place each beaker on a balance to measure the mass of the beakers and their contents.
4. Pour the solution from beaker B into beaker A.
5. Measure the mass of both beakers and contents again.

This is the equation for the reaction that takes place:



- (a) State the law of conservation of mass.

[1]

- (b) The table shows the student's results.

	Mass in g
Beaker A and contents before mixing	68.76
Beaker B and contents before mixing	72.12
Beaker A and contents after mixing	79.23
Beaker B after mixing	56.65

Explain why this reaction does not appear to obey the law of conservation of mass.

[2]

- (c) What is the resolution of the balance used to obtain the results in the table?



Tick (✓) **one** box.

0.01 g ☐ 0.1 g ☐ 1 g ☐ 100 g ☐

[1]

- (d) Calculate the relative formula mass (M_r) of sodium carbonate Na_2CO_3

Relative atomic masses (A_r): Na = 23 O = 16 C = 12

Relative formula mass = _____

[2]

- (e) What is the percentage by mass of sodium in sodium carbonate (Na_2CO_3)?

Percentage = _____

[2]

- (f) The formula of lithium chromate is Na_2CO_3

The charge on a sodium ion is +1

What is the formula of the carbonate ion?

Tick (✓) **one** box.

CO_3^+ ☐

CO_3^{2+} ☐

CO_3^- ☐

CO_3^{2-} ☐

[1]

- (g) Hydrochloric acid (HCl) is a strong acid.





What ions do all acids produce in aqueous solutions?

[1]

(h) The student added a few drops of universal indicator to the hydrochloric acid.

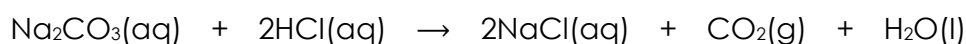
What colour will she observe?

[1]

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2. A student wanted to make 11.5 g of sodium chloride.

The equation for the reaction is:



Relative atomic masses, A_r : H = 1; C = 12; O = 16; Cl = 35.5; Na = 23

(a) Calculate the mass of sodium carbonate the student should react with dilute hydrochloric acid to make 11.5 g of sodium chloride.

Mass of sodium carbonate = _____ g

[5]

(b) The acid used in this reaction has a concentration of $1.0 \times 10^{-3} \text{ mol/dm}^3$. It has a pH of 2.

What is the pH of a solution of the same acid, with a concentration of $1.0 \times 10^{-5} \text{ mol/dm}^3$?

pH = _____

[2]

