**Literacy tasks for revising Chemical Reactions ANSWERS**

**True/False**

**Question 1** Sodium reacting with chlorine gas.

**Observations:** *When a shiny silver coloured solid is heated and placed in a jar of pure oxygen, it burns with a yellow flame and produces a white solid.*

FALSE

sodium + chlorine 🡪 sodium chloride

1. (i) Write a word equation for this reaction

sodium + chlorine 🡪 sodium chlorine

(ii) Write a balanced chemical equation for this reaction, **including physical states.**

FALSE 2Na(s) + Cl2(g) 🡪 2NaCl

Be careful, chlorine gas is Cl2(g)

Na (s) + Cl(g) 🡪 NaCl(s)

1. Describe all observations and link them to the chemical species responsible

When a shiny silver coloured solid sulfur is heated and reacts with chlorine gas.

A yellow flame is seen and a white solid, sodium chloride is produced.

FALSE

sodium is heated, not sulfur

TRUE

1. (i) Name the type of chemical reaction \_\_Combination reaction\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (ii) Justify your choice of reaction type by linking the observed changes to the “definition” of the

type of reaction.

This is a **combination** reaction because two reactants (solid sodium + gaseous chlorine molecules) combine together to form a single solid product (sodium chloride) when heated.

TRUE

1. Discuss why this reaction occurs with reference to electron arrangements of the reactant(s) and product(s).

This reaction occurs between a metal and non-metal element.

The sodium atoms have an electron configuration of 2,8,1 and will lose 1 outer electron to achieve a stable, full outer shells of electrons.

The electron configuration of chlorine atoms is 2, 8,7 and will gain 1 outer electron to achieve a stable, full outer shell of electrons.

TRUE

There is a transfer of electrons.

An ionic bond is formed with 1:1 ratio of sodium to chlorine ions. An ionic compound is formed, NaCl which has no overall charge.

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**Fill in the blanks**

**Use the words provided to help you to fill in the blanks**

**Question 2** Heating iron carbonate powder.

**Observations:** *When a green powder is heated in a Bunsen flame the powder appears to “boil” and a red solid remains.*

1. (i) Write a word equation for this reaction

iron carbonate 🡪 iron oxide + carbon dioxide

(ii) Write a balanced chemical equation for this reaction, **including physical states.**

FeCO3(s) 🡪 FeO(s) + CO2(g)

1. Describe all observations and link them to the chemical species responsible

When a green solid/powder iron carbonate is heated, it gives off a colourless carbon dioxide gas **and** a red solid is formed, iron oxide.

1. (i) Name the type of chemical reaction \_\_\_Decomposition\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) Justify your choice of reaction type by linking the observed changes to the “definition” of the

 type of reaction.

This is a **decomposition** reaction because a single (solid iron carbonate) reactant forms two separate products (solid iron oxide + carbon dioxide gas) when heated.

1. Explain how you would identify the non-solid products produced in this reaction.

The carbon dioxide gas produced, if bubbled into limewater will turn colourless limewater a cloudy/milky colour.

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**Comprehension**

**Read the following paragraph and use it to answers the questions below**

When a colourless solution of silver nitrate and pale orange solution of iron(II) iodide are added together, a cream coloured solid/precipitate of silver iodide is produced, which sinks to the bottom of a pale green solution of iron(II) nitrate.

This is an **precipitation** reaction because two solutions (silver nitrate and iron(II) iodide) combine together to produce a solid/precipitate (silver iodide) and a solution (iron(II) nitrate.

According to the solubility rules, “Nitrates are all **soluble**”, so silver nitrate is a soluble solution.

and according to the solubility rules, “Iodides are all **soluble** except silver iodide and lead iodide”, so iron(II) iodide is a soluble solution.

After they are mixed two new products are possible: silver iodide and iron(II) nitrate.

Iron(II) nitrate remains in solution because the attractive forces between the water molecules and the Fe2+ and NO3- ions are stronger than the attractions between the oppositely charged ions (Fe2+ and NO3- ions).

Silver iodide is insoluble because the attractive forces between the water molecules and the Ag+ and I- ions are weaker than the attractions between the oppositely charged ions (Ag+ and I- ions).

The spectator ions are Fe2+ and NO3- ions because they do not form the precipitate.

silver nitrate + iron iodide 🡪 silver iodide + iron nitrate

2AgNO3(aq) + FeI2(aq) 🡪 2AgI(s) + Fe(NO3)2(aq)

2Ag+(aq) + 2I-(aq) 🡪 2AgI(s) **or** Ag+(aq) + I-(aq) 🡪 AgI(s)

**Question 3** Adding silver nitrate solution to iron (II) iodide solution.

**Observations:** *When a colourless solution is added to a pale green solution, a white solid forms in a pale green solution.*

ALL the answers to the questions are provided in the paragraph above.

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**Cloze test**

**Write in the missing words for each of the answers below**

**Question 4** Reaction of magnesium metal with silver nitrate solution

**Observations:** *When a grey coloured metal is placed into a colourless solution, the colour of the solution stays colourless and silver coloured crystals form a coating on the grey metal which becomes thinner.*

1. (i) Write a word equation for this reaction

magnesium + silver nitrate 🡪 silver + magnesium nitrate

(ii) Write a balanced chemical equation for this reaction, **including physical states.**

Mg(s) + 2AgNO3(aq) 🡪 2Ag(s) + Mg(NO3)2(aq)

1. Describe all observations and link them to the chemical species responsible

When a grey coloured metal/solid magnesium is placed into a colourless solution of silver nitrate, a silver coloured solid of silver forms on the surface and the solution turns colourless because of the Mg2+/Mg(NO3)2

1. (i) Name the type of chemical reaction \_\_\_\_Displacement\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) Justify your choice of reaction type by linking the observed changes to the “definition” of the type of reaction.

This is a **displacement** reactionbecause a more reactive metal (magnesium) takes the place of a less reactive metal (silver **ions**) in a compound.

1. Use the activity series on the data sheet to explain why this reaction occurs by comparing the relative reactivity of the chemical species.

Magnesium is a more reactive metal than silver and so magnesium will have preference for ending up in its stable ionic/compound form.

Magnesium loses its valence electrons more easily and “forces” the silver **ions** to accept them.

1. (i) Identify any spectator ions in this reaction.

NO3- ions are spectator ions because they are not involved in the reaction/neither lose or gain electrons

(ii) Write a balanced ionic equation that does not include spectator ions.

Mg (s) + 2Ag+(aq) 🡪 2Ag(s) + Mg2+(aq)

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