

**Introducing Chemical reactions – 2022 GCSE Gateway Chemistry A****1. May/2022/Paper\_ J248/01/No.1**

Which state symbol is used for liquids?

- A (aq)
- B (g)
- C (l)
- D (s)

Your answer

[1]

**2. May/2022/Paper\_ J248/02/No.22(a)**

Hydrogen peroxide,  $\text{H}_2\text{O}_2$ , is used as a source of oxygen gas.

Hydrogen peroxide decomposes to make oxygen gas,  $\text{O}_2$ , and water.

(a) Write the **balanced symbol** equation for this reaction.

..... [2]

**3. May/2022/Paper\_ J248/03/No.9**

One mole of hydrogen gas,  $\text{H}_2$ , fills a volume of  $24 \text{ dm}^3$ .

How much volume does 2.0 g of hydrogen gas fill?

- A  $12 \text{ dm}^3$
- B  $24 \text{ dm}^3$
- C  $36 \text{ dm}^3$
- D  $48 \text{ dm}^3$

Your answer

[1]

**4. May/2022/Paper\_ J248/03/No.16(d)**

**(d)** Ethene reacts with bromine to make a product.

The relative formula mass of the product is 187.8.

There are **2** carbon atoms and **4** hydrogen atoms in the product.

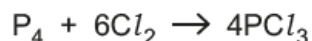
Calculate how many bromine atoms are in the product.

Number of bromine atoms = ..... **[3]**

## 5. May/2022/Paper\_J248/03/No.21(a)

Phosphorus can exist as  $P_4$  molecules.

Phosphorus trichloride,  $PCl_3$ , is made in the reaction of phosphorus,  $P_4$ , and chlorine as shown in the equation.



(a) (i) A scientist starts the reaction with 2.0 mol of phosphorus,  $P_4$ .

Calculate the mass of 2.0 mol of phosphorus.

Mass of phosphorus = ..... g [2]

(ii) Calculate the maximum mass of phosphorus trichloride,  $PCl_3$ , that could be made from 2.0 mol of phosphorus,  $P_4$ .

Maximum mass of phosphorus trichloride = ..... g [3]

(iii) The scientist reacts the 2.0 mol of phosphorus,  $P_4$ , with 866.2 g of chlorine,  $Cl_2$ .

Which is the **limiting reactant**? Explain your answer.

Limiting reactant .....

Explanation .....

.....

.....

.....

[4]

## 6. May/2022/Paper\_J248/03/No.22

Compounds that contain the element zinc, Zn, have many uses.

(a) Calculate the mass of one atom of zinc.

The Avogadro constant is  $6.02 \times 10^{23}$ .

Give your answer to 3 significant figures.

Mass of one atom of zinc = ..... g [3]

(b) Zinc bromide is an ionic compound made from zinc ions,  $\text{Zn}^{2+}$ , and bromide ions,  $\text{Br}^-$ .

(i) Construct a **balanced ionic** equation for the formation of zinc bromide.

..... [2]

(ii) Zinc bromide can conduct electricity when aqueous or molten, but not when solid.

Zinc metal can conduct electricity when solid.

Explain why.

Zinc bromide .....

.....

Zinc metal .....

.....

[3]

- (c) Zinc oxide, ZnO, is another compound containing zinc.

The table shows some information about four different zinc oxide particles.

Particle	Size of zinc oxide particles (m)	Cost per gram (£/g)	Purity (%)
<b>A</b>	$1.85 \times 10^{-7}$	0.05	95.00
<b>B</b>	$6.54 \times 10^{-9}$	0.31	99.99
<b>C</b>	$8.52 \times 10^{-7}$	0.87	99.99
<b>D</b>	$4.02 \times 10^{-8}$	1.84	99.99

- (i) Which particles are nanoparticles?

Tick (✓) **two** boxes.

<b>A</b>	<input type="checkbox"/>
<b>B</b>	<input type="checkbox"/>
<b>C</b>	<input type="checkbox"/>
<b>D</b>	<input type="checkbox"/>

[1]

- (ii) A scientist wants to buy some zinc oxide particles to use in suncream. A large surface area to volume ratio is important.

Which particle, **A**, **B**, **C** or **D**, would be the most suitable for use in suncream?

Explain your answer.

Particle .....

Explanation .....

.....

.....

.....

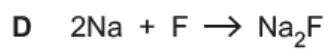
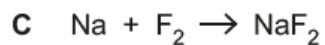
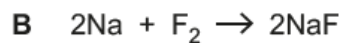
[3]

## 7. May/2022/Paper\_J248/04/No.11

Sodium, in Group 1, reacts with fluorine in Group 7.

Sodium fluoride is made.

What is the **balanced symbol** equation for the reaction?



Your answer

[1]