

## Y12 Chemistry Test 1

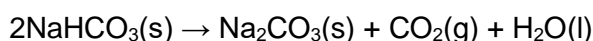
Name: .....

Date:.....

**Q1.** A compound has the composition by mass of 54.5% C, 9.1% H and 36.4% O. What is its empirical formula?

- A C<sub>2</sub>H<sub>2</sub>O
- B C<sub>2</sub>H<sub>4</sub>O
- C C<sub>4</sub>H<sub>9</sub>O
- D C<sub>6</sub>H<sub>10</sub>O<sub>4</sub>

**Q2.** Sodium hydrogencarbonate decomposes on heating.



What is the maximum volume of carbon dioxide, in dm<sup>3</sup>, which could be obtained by heating 0.25 mol sodium hydrogencarbonate?

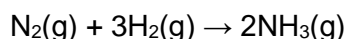
The gas volume is measured at room temperature and pressure when the molar volume of a gas = 24 dm<sup>3</sup> mol<sup>-1</sup>.

- A 3
- B 6
- C 12
- D 24

**Q3.** How many moles of **ions** are present in 30 cm<sup>3</sup> of 0.025 mol dm<sup>-3</sup> barium hydroxide solution, Ba(OH)<sub>2</sub>(aq)?

- A 0.00075
- B 0.00150
- C 0.00225
- D 0.00450

**Q4.** In the synthesis of ammonia, 56.0 g nitrogen was reacted with excess hydrogen.



The mass of ammonia produced was 6.00 g.

What is the percentage yield of ammonia?

- A 5.66
- B 8.82
- C 9.10
- D 10.7

**Q5.** Calculate the empirical formula of the compound with the percentage composition by mass:

Li = 17.9%; P = 26.8%; O = 55.3%

Molar masses / g mol<sup>-1</sup> Li = 6.9, P = 31.0, O = 16.0

- A Li<sub>2</sub>P<sub>3</sub>O<sub>6</sub>

(1)

- B  $\text{Li}_3\text{PO}_3$
- C  $\text{LiPO}_3$
- D  $\text{Li}_3\text{PO}_4$

**Q6.** When 1.270 g of copper ( $A_r = 63.5$ ) is added to excess silver nitrate solution, 4.316 g of silver ( $A_r = 107.9$ ) forms.

The ionic equation for the reaction is:

- A  $\text{Cu(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{Ag(s)}$
- B  $2\text{Cu(s)} + \text{Ag}^{2+}(\text{aq}) \rightarrow 2\text{Cu}^+(\text{aq}) + \text{Ag(s)}$
- C  $\text{Cu(s)} + \text{Ag}^{2+}(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + \text{Ag(s)}$
- D  $\text{Cu(s)} + \text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^+(\text{aq}) + \text{Ag(s)}$

**Q7.** Sea water contains 2.7 mg of sulfate ions per kilogram.

What is the concentration of sulfate ions in parts per million by mass?

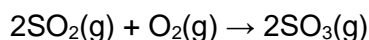
- A  $2.7 \times 10^{-6}$
- B  $2.7 \times 10^{-3}$
- C 2.7
- D  $2.7 \times 10^3$

**Q8.** What is the empirical formula of the oxide formed when 2.6 g of chromium produces 3.8 g of chromium oxide?

Molar masses /  $\text{g mol}^{-1}$  Cr = 52.0, O = 16.0

- A CrO
- B  $\text{CrO}_2$
- C  $\text{Cr}_2\text{O}_3$
- D  $\text{Cr}_3\text{O}_4$

**Q9.** Consider the reaction



What is the maximum volume, in  $\text{dm}^3$ , of sulfur trioxide that could be obtained when  $0.5 \text{ dm}^3$  of sulfur dioxide is mixed with  $1 \text{ dm}^3$  of oxygen, under suitable conditions?

All measurements are made at the same temperature and pressure.

- A 0.5
- B 1.5
- C 2.0
- D 2.5

**Q10.** The process with the highest atom economy is the production of

- A propene by cracking eicosane,  $\text{C}_{20}\text{H}_{42}$ .
- B 1-chloropropane from propane and chlorine.

- C cyclohexene by reforming hexane.
- D poly(propene) by polymerising propene.

**Q11.** Calculate the total number of **atoms** in 8.5 g of  $\text{CH}_2\text{Cl}_2$ .

DATA: Molar mass of  $\text{CH}_2\text{Cl}_2 = 85 \text{ g mol}^{-1}$ .

Avogadro constant =  $6.0 \times 10^{23} \text{ mol}^{-1}$

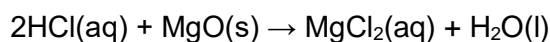
- A  $1.8 \times 10^{23}$
- B  $2.4 \times 10^{23}$
- C  $3.0 \times 10^{23}$
- D  $3.0 \times 10^{24}$

**Q12.** Cold water fish require a minimum of 8 parts per million by mass (ppm) of oxygen dissolved in water.

The minimum mass of oxygen required in 1 kg of water is

- A  $8 \times 10^{-6} \text{ g}$
- B  $8 \times 10^{-3} \text{ g}$
- C  $8 \times 10^{-2} \text{ g}$
- D  $8 \times 10^{-1} \text{ g}$

**Q13.** Magnesium chloride crystals were prepared using the following reaction.



(a) The ionic equation for this reaction is

- A  $2\text{Cl}^-(\text{aq}) + \text{Mg}^{2+}(\text{s}) \rightarrow \text{MgCl}_2(\text{aq})$
- B  $2\text{Cl}^-(\text{aq}) + \text{MgO}(\text{s}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{O}^{2-}(\text{l})$
- C  $2\text{H}^+(\text{aq}) + 2\text{Cl}^-(\text{aq}) + \text{MgO}(\text{s}) \rightarrow \text{Mg}^{2+}(\text{Cl}^-)_2(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- D  $2\text{H}^+(\text{aq}) + \text{MgO}(\text{s}) \rightarrow \text{Mg}^{2+}(\text{aq}) + \text{H}_2\text{O}(\text{l})$

(b) The amount of hydrochloric acid used was 0.10 mol. Which of the following solutions of hydrochloric acid contains this amount of HCl?

- A  $100 \text{ cm}^3$  of  $0.10 \text{ mol dm}^{-3}$
- B  $40 \text{ cm}^3$  of  $0.25 \text{ mol dm}^{-3}$
- C  $25 \text{ cm}^3$  of  $0.40 \text{ mol dm}^{-3}$
- D  $20 \text{ cm}^3$  of  $5.00 \text{ mol dm}^{-3}$

(c) An **excess** of magnesium oxide was reacted with the 0.10 mol of hydrochloric acid.

Which of the following is the **smallest** mass which would provide an excess of magnesium oxide?

Molar mass of  $\text{MgO} = 40.3 \text{ g mol}^{-1}$

- A 1.50 g
- B 2.50 g
- C 3.00 g
- D 5.00 g

(d) What is the first step in obtaining pure hydrated crystals of magnesium chloride from the resulting reaction mixture?

- A Heating the mixture to concentrate it.
- B Allowing the mixture to evaporate slowly.
- C Filtering the mixture.
- D Distilling the mixture.

(e) Use the data below to calculate the number of moles of water of crystallization in each mole of hydrated magnesium chloride.

Substance	Molar mass / g mol <sup>-1</sup>
Magnesium chloride	95.1
Hydrated magnesium chloride	203.1

- A 2
- B 4
- C 6
- D 8

(Total for question = 5 marks)

### Y12 Chemistry Test 1

Name:.....

Date: .....

<b>Ques.</b>	<b>Ans.</b>	<b>Ques.</b>	<b>Ans.</b>
<b>1</b>		<b>10</b>	
<b>2</b>		<b>11</b>	
<b>3</b>		<b>12</b>	
<b>4</b>		<b>13-a</b>	
<b>5</b>		<b>13-b</b>	
<b>6</b>		<b>13-c</b>	
<b>7</b>		<b>13-d</b>	
<b>8</b>		<b>13-e</b>	

<b>9</b>		<b>Total</b>	<b>/17</b>
----------	--	--------------	------------