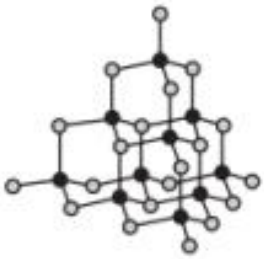
SECTION 1 (8 marks)

1. The table below gives the number of protons, neutrons and electrons found in four atoms
   Identify the atom with the negative charge

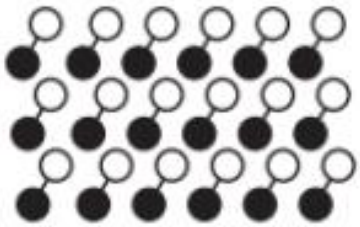
Atom	Protons	Neutrons	Electrons
A	12	12	12
B	14	13	12
C	7	7	8
D	45	45	45

2. Which of the following diagrams could represent magnesium oxide

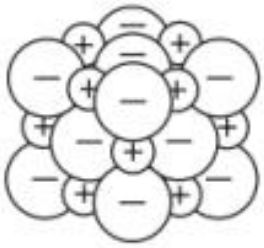
A



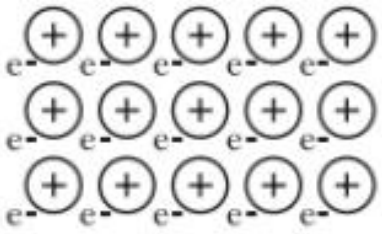
C



B



D



3. Identify the two substances that contain covalent bonds

A sodium bromide and cobalt chloride

B sulphur dioxide and sodium chloride

C sulphur dioxide and graphite

D lithium and lithium chloride

4. Which of the following statements describes the concentration of hydrogen H^+ ions and hydroxide OH^- ions in a **acidic** solution

A the concentration of $H^+_{(aq)}$ and $OH^-_{(aq)}$ ion are zero
B the concentration of $H^+_{(aq)}$ and $OH^-_{(aq)}$ ion are equal
C the concentration of $H^+_{(aq)}$ ion is greater than the concentration of $OH^-_{(aq)}$ ions
D the concentration of $OH^-_{(aq)}$ ions is greater than the concentration of $H^+_{(aq)}$ ions

5. How many moles are present 36g of water H_2O

A 44
B 20
C 2
D 0.2

6. 1 mole of lithium chloride can be used to prepare

A 250 cm^3 of 0.2 mol l^{-1} solution
B 500 cm^3 of 0.2 mol l^{-1} solution
C 500 cm^3 of 2 mol l^{-1} solution
D 250 cm^3 of 2 mol l^{-1} solution

7. Which of the following oxides, when shaken with water, would leave the pH unchanged?
   (you may wish to use the data booklet to help you)

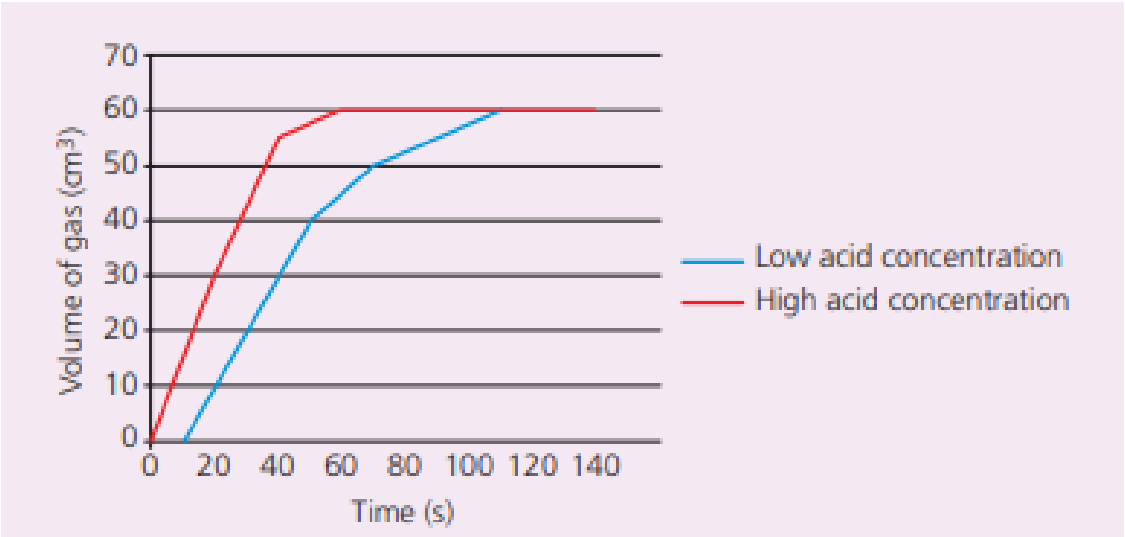
   A copper (II) oxide
   B lithium oxide
   C sulphur dioxide
   D sodium oxide

8. Ionic compounds don't conduct electricity when solid because

   A the protons are not free to move
   B the protons are not free to move
   C the ions are not free to move
   D the nucleus is not free to move

SECTION B (22 marks)

1. Graph below can be used to show the change in the rate of a reaction as the reaction proceeds.
   The graph shows the volume of gas produced in experiments over a period of time using low and high concentration acid

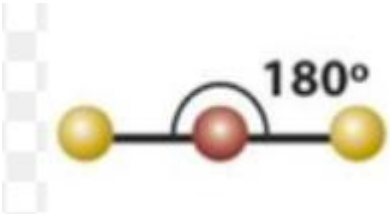


(a) State the time, in seconds, at which the reaction stopped with high acid concentration (1)

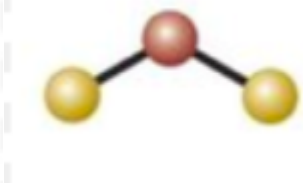
(b) Calculate the average rate of reaction, in cm^3s^{-1}, for the first 40 seconds for the low acid concentration
Show your working clearly (2)

(c) Suggest a reason for the reaction slowing down as the time goes on in both experiments (1)

2. The shapes of some molecules are given below

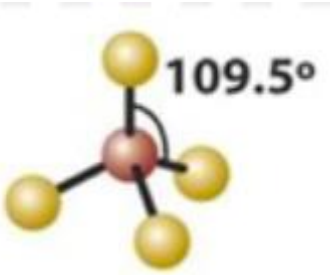


A



B

C



D

(a) Which shape could represent a water H_2O molecule (1)

(b) What name is given to the shape of molecule C? (1)

(c) Draw the shape of a methane molecule CH_4 (1)

3.

In an experiment 4.9 g of magnesium reacted with excess dilute hydrochloric acid. Calculate the mass of hydrogen produced in this reaction. (3)

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

(3)

3. A pupil investigated the reaction between dilute hydrochloric acid and copper (II) carbonate

(a) One experiment involved measuring the volume of carbon dioxide produced when calcium carbonate was used.

Time (seconds)	0	10	20	30	40	50	60	70
Volume of CO_2 (cm^3)	0	14		30	38	40	42	42

Draw a line graph of these results on the graph paper provided

(3)

(b) Use the graph to estimate the volume of gas produced at 20 seconds (1)

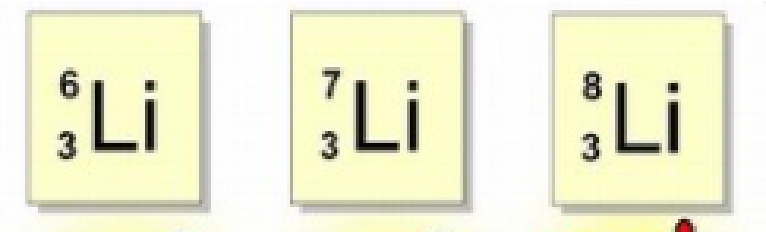
(c) The experiment was repeated at a lower temperature . The concentration and volume of hydrochloric acid and the mass of copper (II) carbonate were kept the same
Predict the final volume of carbon dioxide produced at this temperature. (1)

(d) Name the salt produced when dilute hydrochloric acid reacts copper (II) carbonate (1)

4. The metal Francium was discovered in year 1939 it was mistakenly thought to not be a rubidium and not actually a new metal at all. Using your knowledge of chemistry, comment on why this mistake may have been made (3 marks)

6.

A sample of lithium contains 3 types of atom



(a) State what term is used to describe these different types of lithium

(b) Explain why the mass number of each atom is different

(c) The sample of lithium has an average atomic mass of 6.9. State the mass number of the most common type of atom in the sample of lithium