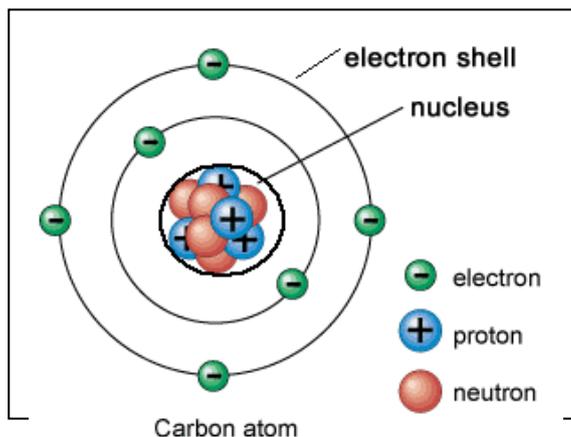


Section B consists of 7 short answer questions. Write all answers in the space provided.

1) Draw a picture of an atom in the space provided below. Label the following.

- a) neutron
- b) proton
- c) electron
- d) nucleus
- e) first and second energy levels.



5 marks

2) Below are the formulae and charge of several ions question 2.

Ion	Formula	Charge
Nitrate	NO ₃	-1
Carbonate	CO ₃	-2
Sulfate	SO ₄	-2
Sodium	Na	+1
Ammonium	NH ₄	+1
Chloride	Cl	-1
Copper	Cu	+2
Phosphate	PO ₄	-3

a) Complete the table below

Compound	Formula
Sodium chloride	NaCl
Ammonium chloride	NH ₄ Cl
Ammonium carbonate	(NH ₄) ₂ CO ₃
Copper sulfate	CuSO ₄
Copper carbonate	CuCO ₃
Ammonium phosphate	(NH ₄) ₃ PO ₄
Ammonium nitrate	NH ₄ NO ₃
Copper chloride	CuCl ₂
Sodium phosphate	Na ₃ PO ₄
Ammonium sulfate	(NH ₄) ₂ SO ₄

10 marks

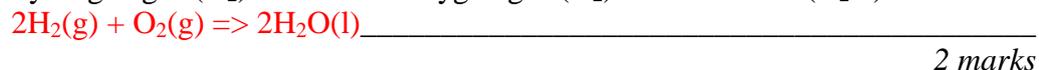
b) The following solutions were mixed to form a precipitate. Give the name of the precipitate.

Solutions	Precipitate
Lead nitrate is mixed with potassium iodide	Lead iodide
Lead nitrate is mixed with sodium carbonate	Lead carbonate
Silver nitrate is mixed with sodium chloride	Silver chloride

3 marks

c) Write balanced chemical equations for the following

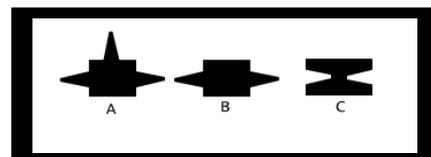
i) Hydrogen gas (H₂) reacts with oxygen gas (O₂) to form water (H₂O)



ii) Methane (CH₄) gas reacts with oxygen (O₂) to form carbon dioxide (CO₂) and water (H₂O).



3) Consider the molecules "A", "B" and "C" pictured on the right.



a) Which molecules can be used to form a thermoplastic?

_____ **B and C** _____ 2 marks

b) Draw a small portion of the resultant thermoplastic.

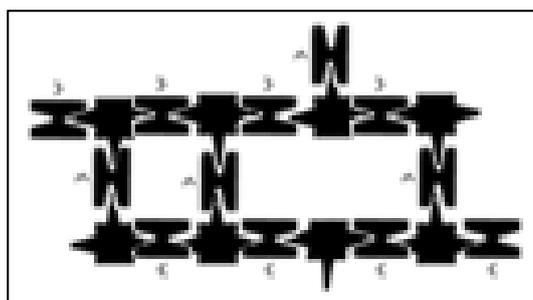


2 marks

d) Which molecules can be used to form a thermosetting plastic?

_____ **A and C** _____ 2 marks

e) Draw a small portion of the resultant thermosetting plastic.



2 marks

The following information relates to question 4.

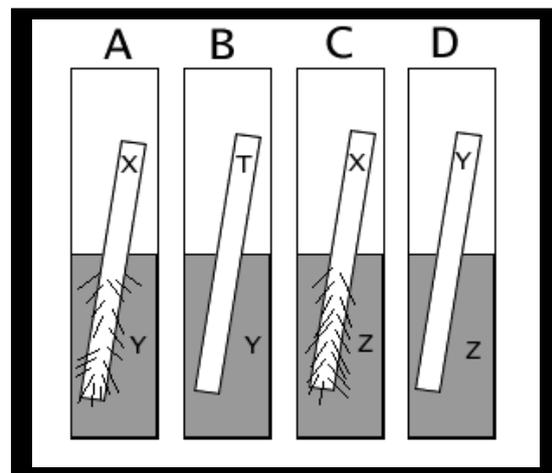
Metals “X”, “T”, “Y” and “Z” were tested with various metal solutions, as shown on the right.

A strip of metal “X” was placed in a solution containing metal “Y”. Solid metal “Y” was deposited.

A strip of metal “T” was placed in a solution containing metal “Y”. No metal was deposited.

A strip of metal “X” was placed in a solution containing metal “Z”. Solid metal “Z” was deposited.

A strip of metal “Y” was placed in a solution containing metal “Z”. No metal was deposited.



4)a) Place the metals in order of increasing reactivity.

T=>Y=>Z=>X 2 marks

b) Metal beams used to construct a bridge are made of metal “T” while the bolts used to secure the beams are made of metal “Y”. Describe what will happen to the bridge and explain why.

The bridge will collapse because the bolts will rust as they are more reactive than metal T.

2 marks

c) Explain the term *sacrificial anode*.

A sacrificial anode is a metal that will prevent the rusting of another metal when the two metals are placed in contact with each other. A sacrificial metal is more reactive than the metal it is protecting.

2 marks

d) A boat is made of metal “Y”. Which metal can be used as a sacrificial anode? Explain.

Metal Z or X because they are more reactive than metal Y.

2 marks

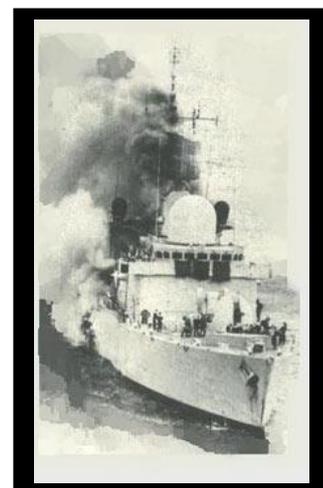
e) A plumber welded a copper pipe to an existing pipe made of iron. In two weeks the iron pipe was completely rusted and burst. Give an explanation.

The iron is more reactive than the copper. It acted as a sacrificial anode to the copper and rusted away.

2 marks

f) Aluminium warships were used extensively by the British Navy. During the Falklands War the Sheffield was hit by a missile and began to burn. Sailors used water to put out the fire only to discover it was like pouring petrol onto the fire. Explain why?

Aluminium is a reactive metal. When exposed to water when it is molten than a reaction takes place where hydrogen gas is produced. This hydrogen gas ignites in an explosive manner.



g) Why is aluminium used extensively for kitchen utensils such as pots and frying pans but not for warships?

Aluminium is safe to use with water in the solid form. But when it melts it reacts vigorously with the water to produce hydrogen gas. War ships are more likely to produce molten aluminium due to explosives.

3 marks

5) Explosions are chemical reactions that occur rapidly, produce gaseous products and a large amount of heat energy.

a) The Space Shuttle burns liquid oxygen and hydrogen to produce steam and heat energy. Write a word equation for this reaction.

_____ hydrogen gas + oxygen gas => water

1 mark

b) For a reaction to be considered explosive it must produce gases and heat. Why? Gas particles, when heated, increase in speed. As they increase in speed they create a pressure wave that causes massive destruction.

2 marks

c) Rusting occurs quickly if the metal is in powder form, heated and placed in a container with a great deal of oxygen. Explain why?

Reactions occur when reactant particles collide with each other. The more collisions per second the faster the reaction. Heat causes the particles to travel faster, hence, colliding more frequently, while increase in surface area means that more reactant particles are exposed. The more oxygen the more collisions that can take place with the metal particles.

3 marks

6) Yeast converts sugar into alcohol (ethanol) and carbon dioxide through a process called *fermentation*.

a) Write the word equation for the process of fermentation.

Sugar => ethanol + carbon dioxide

1 mark

b) Describe a way of purifying alcohol, which boils at 80°C, from wine. Draw the apparatus below. Use the space on the back of this page if you need to.

In your explanation use the following words.

i) Evaporation.

ii) Condensation.

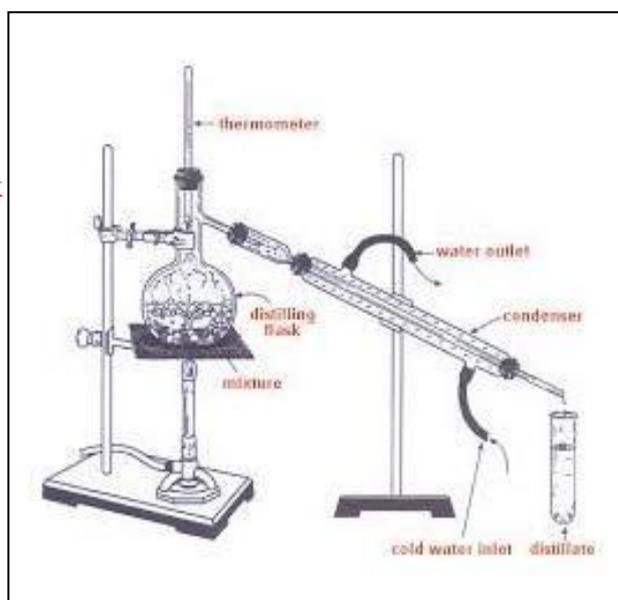
iii) Boiling temperature.

iv) Heating.

v) Cooling.

Using the apparatus shown on the right.

- 1) Place the mixture in a distilling flask
- 2) Heat the mixture to 80 °C
- 3) This is the boiling temperature of ethanol
- 4) The ethanol will evaporate and rise through up the flask and into the condenser where it is cooled.
- 5) Once the vapour is cooled it condenses back into a liquid.



7 marks

7) Global warming is a major challenge of our times.

a) Define a carbon sink and give one example.

A carbon sink is any storage of carbon they include.

Atmosphere where carbon is stored in the form of CO₂

Forests where the carbon is stored in organic plant matter.

Limestone where the carbon is stored as calcium carbonate

Fossil fuel deposits where the carbon is stored in organic molecules that are used as fuel.

2 marks

b) Draw a simplified carbon cycle. In your diagram

i. label 4 carbon sinks

ii. Indicate the chemical reaction that is responsible for placing carbon in a particular carbon sink

iii. Indicate how carbon flows from carbon sink to carbon sink using arrows.

