

To provide an idea about what this book contains, only few pages taken randomly from the book are shown here.

GCE 'O' Level (Pure) Chemistry (Yearly)

C O N T E N T S

Syllabus

-  June **1998** Paper 1 & 2
December **1998** Paper 1 & 2
-  June **1999** Paper 1 & 2
December **1999** Paper 1 & 2
-  June **2000** Paper 1 & 2
December **2000** Paper 1 & 2
-  June **2001** Paper 1 & 2
December **2001** Paper 1 & 2
-  June **2002** Paper 1 & 2
December **2002** Paper 1 & 2
-  June **2003** Paper 1 & 2
December **2003** Paper 1 & 2
-  June **2004** Paper 1 & 2
December **2004** Paper 1 & 2
-  June **2005** Paper 1 & 2
December **2005** Paper 1 & 2
-  June **2006** Paper 1 & 2
December **2006** Paper 1 & 2
-  June **2007** Paper 1 & 2
December **2007** Paper 1 & 2
-  June **2008** Paper 1 & 2
December **2008** Paper 1 & 2
-  June **2009** Paper 1 & 2
December **2009** Paper 1 & 2

JUNE 2009 PAPER 1

MCQ Section

Questions are not shown
in Preview

1. Air filled balloon goes down because air molecules can diffuse downwards.

2. Brown ink can be made by mixing blue and red inks.

1. B Methane is the least dense of all, as it has the lowest relative molecular mass. A lighter gas diffuses faster than a heavier gas. Therefore balloon B will go down most quickly.

2. D One of the spot in black and green inks matches with the yellow spot. Answer A is wrong because black ink does not contain spot matching with spots present in the red ink, therefore choice D is correct.

3. B The purpose of the reaction is to oxidise ethanol to ethanoic acid. On heating, ethanol is expected to vaporise and escape while passing through condenser. Hot vapour of ethanol is condensed to liquid and flows back to the flask, where it may oxidised to ethanoic acid.

4. C CuO is reduced to copper metal by hydrogen. Dry hydrogen gas continues to flow until temperature of CuO comes down. Otherwise air may suck in on cooling and oxygen in air may react with hot-copper to form CuO.

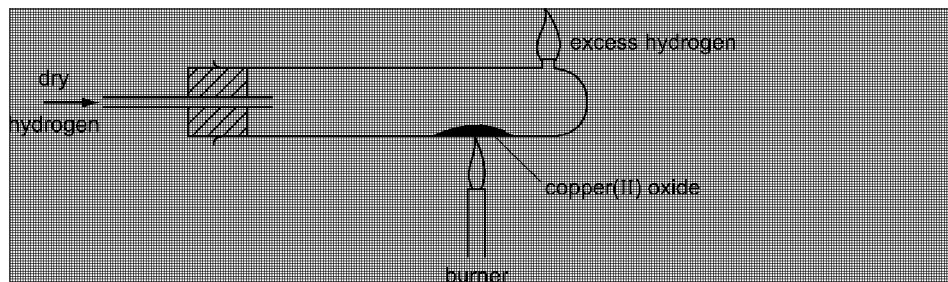
5. B Copper and Iron dissolve in HNO_3 to produce Cu^{2+} , Fe^{2+} ions. The Cu^{2+} ions give blue precipitate with aqueous ammonia and dissolve in excess to produce deep blue solution. Fe^{2+} ion may oxidise to Fe^{3+} giving brown precipitate of $\text{Fe}(\text{OH})_3$.

3. The diagram shows a chromatogram of several inks.

4. The diagram shows apparatus for the purpose of the reaction.

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Questions are not shown
in Preview

7. A In Option A both diamond and graphite have giant molecular structure, whereas in other choices (B, C and D) sand, methane and iodine have simple molecular structures.

8. A The ammonium ion consists of covalent bonds between nitrogen and hydrogen atoms. An ionic bond is formed between the positive ammonium ion (NH_4^+) and negative chloride ion (Cl^-).

9. A The number of neutrons in ^4_2He , $^{12}_6\text{C}$, $^{14}_7\text{N}$, $^{16}_8\text{O}$, $^{28}_{14}\text{Si}$, $^{32}_{16}\text{S}$ & $^{40}_{20}\text{Ca}$ are equal to the number of protons in their nuclei. The rest of all elements (except H) have the number of neutrons more than the number of protons in their nuclei.

10. B 1 mole of a substance contains 6×10^{23} particles (molecules). 9g of water is equivalent to 0.5 mole of water. Since 14g of N_2 ($M_r = 28$) contains 0.5 mole, the number of molecules should be the same i.e. $0.5 \times 6 \times 10^{23}$ molecules.

11. D Number of nitrogen atoms on right side of the equation are $2x + y$, which is only possible in choice D i.e. $2x + y = w$ or $2(3) + 2 = 8$ therefore $v = 3$, $w = 8$, $x = 3$, $y = 2$ and $z = 4$.

Questions are not shown
in Preview

A	1	2	1	1	1
B	1	4	1	2	2
C	3	4	3	2	2
D	3	8	3	2	4

6. D As the element X forms a positive ion, it must be belonging to group 1, 2 or 3 in the periodic table. In this case option D, atomic number 19, (2, 8, 8, 1) belongs to group one.

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JUNE 2009 PAPER 2

THEORY Section

Section A [45 marks]

Answer all the questions in this section.

Question A1

Choose from the following substances to answer the questions below.

Vanadium(V) oxide

Questions are not shown
in Preview

Each substance can be used once, more than once or not at all.

Name a substance which

is used in the Contact process. [1]

has an aqueous solution that reacts with aqueous sodium hydroxide to give a blue precipitate. [1]

is a weak acid. [1]

can be used in the test for sulfur dioxide. [1]

reacts with aqueous potassium iodide to give a brown colour. [1]

Total: 5 marks [5]

Solution

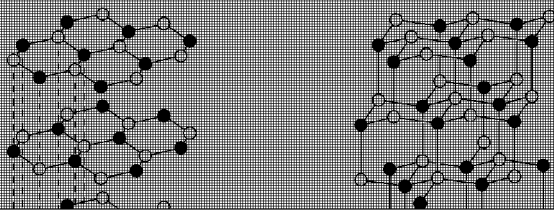
- (a) Vanadium(V) oxide
 (b) Copper(II) chloride
 (c) Ethanoic acid
 (d) Potassium dichromate(VI)
 (e) Chlorine

COMMENT on ANSWER

- “(a) Contact process is used to make H_2SO_4 . V_2O_5 is used as a catalyst in this process.
 (b) Cu^{2+} ion react with NaOH to produce $\text{Cu}(\text{OH})_2$ ppt which is blue in colour.
 (c) Ethanoic acid is the only weak acid in the list. Other two acids in the list are strong acids.
 (d) Potassium dichromate(VI) turns green in SO_2 .
 (e) Any oxidising agent could be quoted. Other oxidising agents in the list are manganese(IV) oxide, potassium dichromate(VI).”

Question A2

Diagram (a) shows the structure of graphite. The layers of atoms are bonded together.



Questions are not shown
in Preview

Solution

- (a) Boron nitride has structure like graphite having layers. Each layer is bonded with weak Van der Waals forces. As the layers can slip or slide over each other, therefore boron nitride can be used as a lubricant.
- (b) In the structure B of boron nitride, each boron is bonded with three nitrogen and each nitrogen is bonded with three boron atoms, having no free electrons, therefore it will not conduct electricity.
- (c) All the atoms are bonded with covalent bonds making giant covalent structure, therefore hard structure is formed which can be used in cutting tools.

COMMENT on ANSWER

- “(a) As the graphite has layer structure, which can slide over each other, therefore graphite can be used as a lubricant.
- (b) In structure B boron nitride makes diamond like structure, though nitrogen has two unbonded electrons, but they can not delocalise due to boron atom in between two nitrogen atoms.
- (c) Due to diamond like structure, BN in structure B is hard and can be used in cutting tools.”

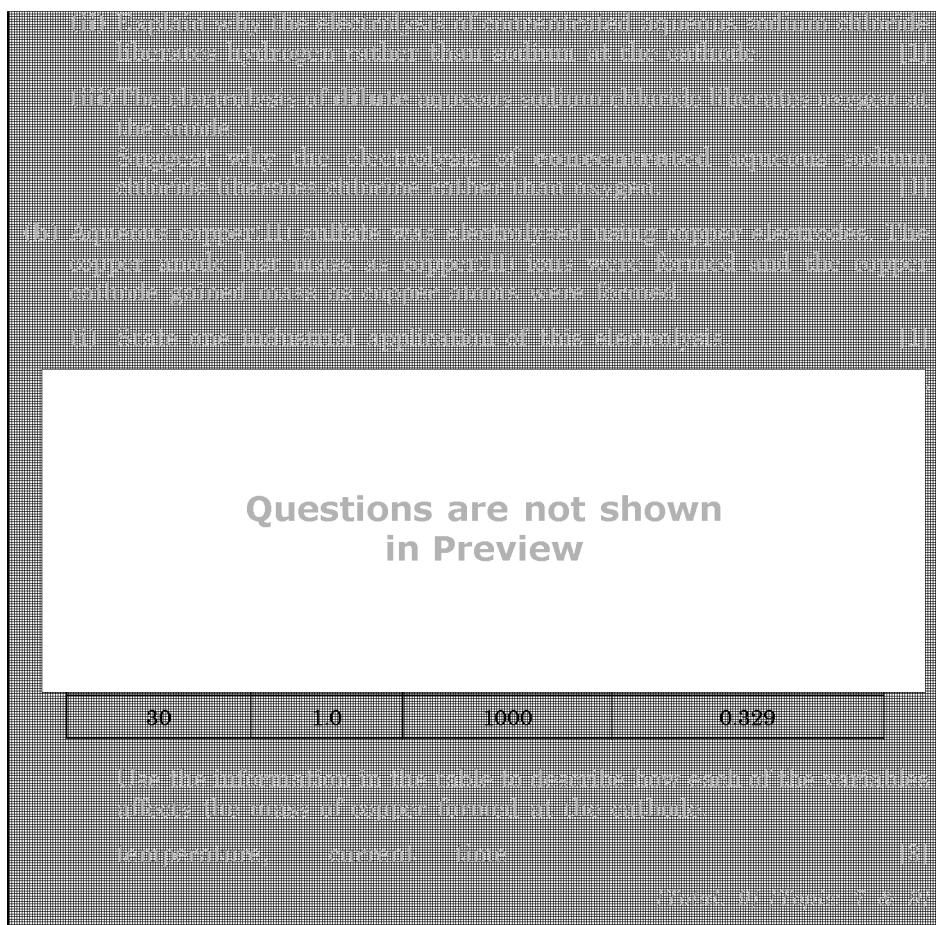
Question A3

Diagram (a) shows the decomposition of a compound in the presence of an oxidising agent.

Diagram (b) shows the decomposition of a compound in the presence of a reducing agent.

Questions are not shown
in Preview

dilute sulfuric acid	oxygen	hydrogen
.....		
.....		



COMMENT on ANSWER

“(a) (i)

- In the electrolysis of $\text{CuSO}_4(\text{aq})$ two anions i.e. SO_4^{2-} & OH^- ions are available. But OH^- ions will discharge preferably at anode, $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$ therefore O_2 will evolve at anode.
- From two cations i.e. Cu^{2+} & H^+ , Cu^{2+} being lower in reactivity series will discharge. $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}(\text{s})$ and copper metal will deposit.
- Dilute H_2SO_4 will produce H^+ & SO_4^{2-} from H_2SO_4 and H^+ & OH^- ions from water. ”

Solution

(a) (i)

electrolyte	ions in electrolyte	product at anode	product at cathode
dilute aqueous potassium nitrate	K^+ , H^+ , OH^- and NO_3^-	oxygen	hydrogen
concentrated aqueous sodium chloride	Na^+ , H^+ , OH^- and Cl^-	chlorine	hydrogen
dilute aqueous copper(II) sulfate	Cu^{2+} , SO_4^{2-} , H^+ and OH^-	oxygen	copper
dilute sulfuric acid	H^+ , OH^- , SO_4^{2-}	oxygen	hydrogen

(ii) Hydrogen being lower in reactivity series than sodium, hydrogen ion gain electrons more easily.

(iii) Chloride ion concentration is greater than hydroxide ion concentration therefore chloride ion has a greater chance to discharge at anode.

(b) (i) purification of copper.

(ii) temperature: no effect or no change.

current: increasing current increases mass of copper.

time: increasing time increases mass of copper deposit at cathode.

NOVEMBER 2009 PAPER 2**THEORY Section****Section A [45 marks]**Answer **all** the questions in this section.**Question A1**

Use the names of the following compounds to answer the questions below.

- ammonium sulfate
- calcium oxide
- copper(II) chloride
- ethanoic acid
- ethane
- nitrogen dioxide
- calcium iodide
- sulfur dioxide

Each compound may be used more than once or not at all.

Questions are not shown
in Preview

(a) Define the term compound. [1]

(b) Explain why calcium iodide will not conduct electricity when solid but will conduct when dissolved in water. [2]

(Total: 3 Marks)

Solution

- (a) (i) Ethene
 (ii) Sodium iodide
 (iii) Ammonium sulfate
 (iv) Nitrogen dioxide
 (v) Calcium oxide
 (vi) Calcium oxide
- (b) When two or more than two different elements combine chemically, a compound is formed.
- (c) The ions (Na^+ & I^-) will not be free to move in solid state. In aqueous state ions will be free and able to move towards cathode and anode.

COMMENT on ANSWER

“(a) (i) When alkanes are cracked, alkenes and hydrogen may be produced.

(iv) Nitrogen and oxygen of air react in lightning to produce nitrogen dioxide.

(v) Calcium oxide being basic in nature is used to reduce soil acidity.

(vi) Calcium oxide dissolves in water to produce $\text{Ca}(\text{OH})_2$ which is an alkali.”

Question A2

In the presence of yeast, glucose (C₆H₁₂O₆) is converted into ethanol and carbon dioxide.
 (a) Write the equation for this reaction. [1]
 (b) Name the reaction. [1]
 (c) Explain how the speed of this reaction varies with the temperature. Describe your answer using the word 'optimum'. [3]
 (d) Explain why the yeast formed after a certain period of time would not ferment.

Questions are not shown
in Preview

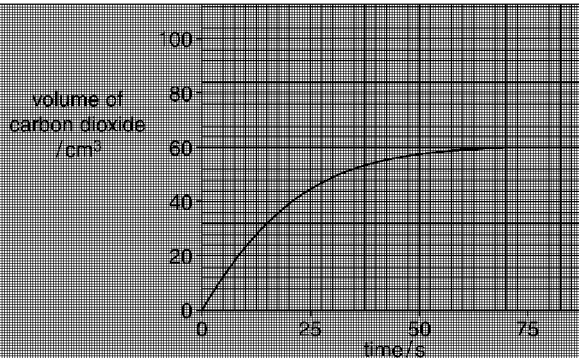
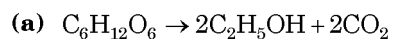


Fig. 1

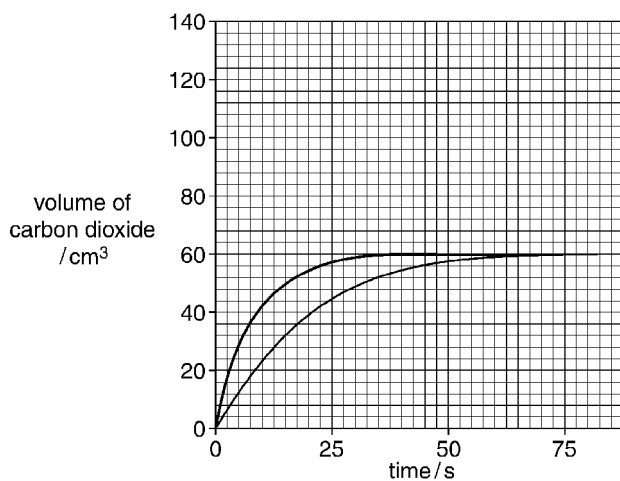
Solution



(b) Fermentation

(c) Speed of the reaction increases with the increase in temperature. At higher temperature, yeast is denatured, therefore reaction slows down and then stops.

(d)



COMMENT on ANSWER

“(c) At higher temperature yeast is denatured and stop acting as a catalyst.”

Question A3

Dry air contains mainly nitrogen and oxygen together with small amounts of argon and carbon dioxide.

(a) State the approximate percentages of nitrogen and oxygen in dry air.
 nitrogen% oxygen%

(b) For an atom of argon, $A_r = 40$.



(c) A small amount of xenon is present in the air. Several compounds of xenon have been made in recent years.

A compound of xenon contained 9.825 g of xenon, 1.200 g of oxygen and 5.700 g of fluorine.

Calculate the empirical formula of this compound.

COMMENT on ANSWER

“(d) As the concentration of acid is doubled, the speed of reaction is expected to be doubled, therefore time taken to produce 60cm³ of carbon dioxide will be about 35 seconds.”

Solution

(a) nitrogen **79**% oxygen **20**%

(b) (i) Atoms of the same element having same number of protons but different number of neutrons.

(ii) number of electrons: 18
 number of neutrons: 22

(c) (i) $TiCl_4 + 4Na \rightarrow Ti + 4NaCl$

(ii) To provide inert atmosphere over the reactants so that sodium may not react with oxygen.

(d) Elements	Xenon	Oxygen	Fluorine
Mass (g)	9.825	1.200	5.700
	<u>9.825</u>	<u>1.200</u>	<u>5.700</u>
	131	16	19
No. of moles	0.075	0.075	0.3
Simple ratio	1	1	4
Empirical formula =	XeOF ₄		