AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION 2008

Chemistry Paper II

Time allowed: 2 hours 25 minutes Marks 40

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign that it is correct.

I agree that this is my name and school. **Candidate's signature**

2. Write the number of the seat in which you are sitting. ☐

3. RUBRIC. There are SIX questions. Answer ALL SIX questions. Questions 5 and 6 offers choices. Answer any ONE choice from each.

4. When answering the questions:

   Read each question carefully.
   Use ONLY black ink.
   Do not use staples, paper clips, glue or correcting fluid.
   DO NOT write outside the answer box.
   Complete your answer in the allocated space only.

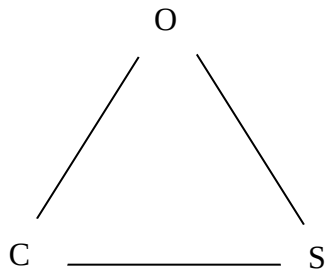
5. The marks for the questions are shown in brackets ( ).

6. You may use a simple calculator if you wish.

Q.1. (Total 6 Marks)

a. Which type of information do we get by studying analytical chemistry? (1 Mark)

b. Three different elements react with each other according to the law of reciprocal proportion.



i. What are the compounds formed? (2 Marks)

ii. What are the proportions of the elements in each compound? (2 Marks)

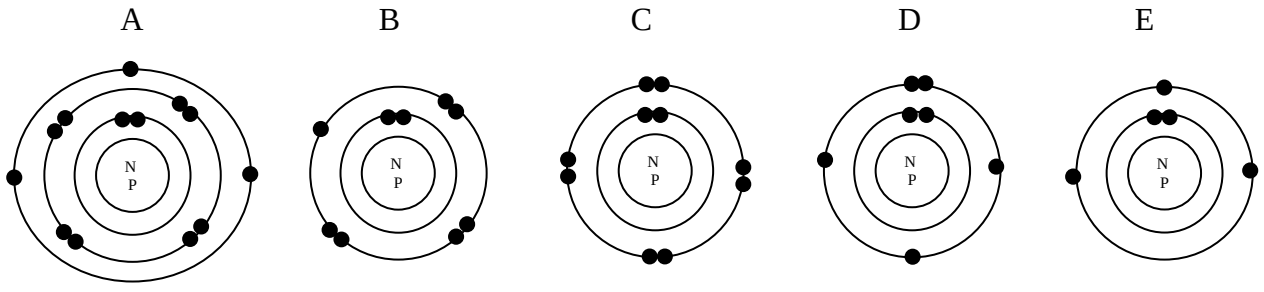
c. How many atoms of carbon in one mole? And what is the unit of molar mass? (1 Mark)

Q.2. (Total 8 Marks)

a. Write any TWO applications of isotopes. (2 Marks)

b. There are three isotopes of uranium, like $^{234}_{92}U$ $^{235}_{92}U$ and $^{238}_{92}U$. How many neutrons are contained in each isotopes of uranium? (1 Mark)

c.



i. Identify and write the names of B and C? (1 Mark)

ii. Which atomic orbital diagram corresponds to group V and which one to period 3? (1 Mark)

d. Sodium chloride is an ionic compound. It consists of sodium ions and chloride ions in an ionic lattice.

i. Which type of ions represents sodium ions in the lattice? (1 Mark)

_____

_____

ii. Which type of ions represents chloride ions in the lattice? (1 Mark)

_____

_____

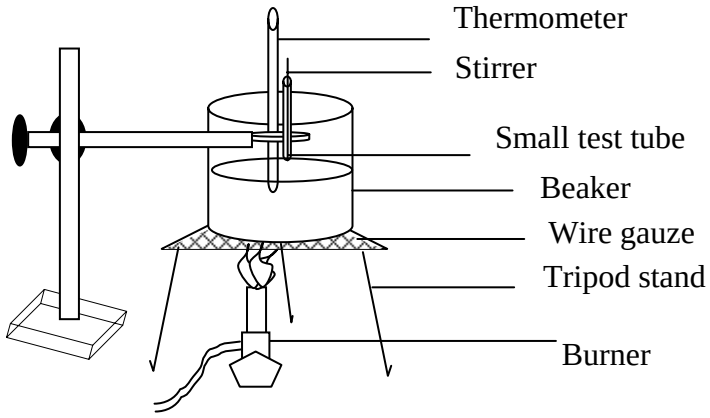
iii. How is a sodium ion found from a sodium atom? (1 Mark)

_____

_____

Q.3. (Total 8 Marks)

a. The apparatus shown below can be used to determine the boiling point of a liquid which boils between 70° and 80°C.



i. Why is the use of the stirrer a must? (1 Mark)

_____

_____

ii. Show how boiling indicates that a liquid is impure. (1 Mark)

_____

_____

iii. Explain how evaporation is different from boiling. (1 Mark)

_____

_____

b. A solution contains 63.0g of oxalic acid dissolved per dm^3. Calculate its molarity. (2 Marks)

Ans.

c.

i. Define suspension. (1 Mark)

_____

_____

ii. Give TWO differences between solution and suspension. (2 Marks)

Solution	Suspension

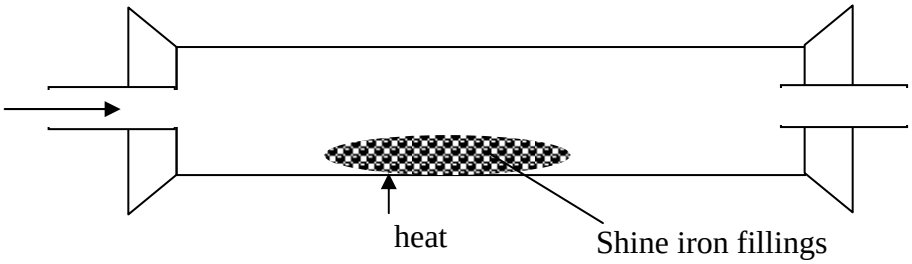
Q.4. (Total 8 Marks)

a. Calculate the amount of nickel deposited on the cathode when 10 amperes of current is passed through the sodium nickel cyanide solution for 5 minutes. (Electro chemical equivalent for Ni is $0.0003057gc^{-1}$).

(3 Marks)

Ans g

b.



The diagram above shows an experiment in which steam was passed over hot iron fillings. The products of the reaction are iron oxide (Fe_3O_4) and H_2, write the balanced equation of the reaction. Describe what you would see as the iron reacts with steam. (2 Marks)

c. In heat of reaction and in enthalpy heat change occurs. How do they differ from each other? (1 Mark)

_____

_____

d. Why does an enthalpy change show a positive sign in endothermic reaction and a negative sign in exothermic reaction? (2 Marks)

_____

_____

_____

_____

Q.5. (Total 5 Marks)

EITHER

a. Describe any FIVE important features of the Modern periodic table.

OR

b. Describe any FIVE properties of ionic and covalent compounds.

Q.6. (Total 5 Marks)

EITHER

a. Describe the construction, working and uses of the dry cell.

OR

b. Describe any five examples of exothermic changes using balanced chemical equations.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION 2009

Chemistry Paper II

Time allowed: 2 hours 25 minutes Marks 40

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign that it is correct.

I agree that this is my name and school. **Candidate's signature**

2. RUBRIC. There are SEVEN questions. Answer ALL SEVEN questions. Questions 5, 6 & 7 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

Q.1. (Total 8 Marks)

a. i. Show the formation of the ammonium ion using a dot and cross diagram. (2 Marks)

ii. Which type of bond is formed by the ion? (1 Mark)

_____

iii. Give ONE example for the above type of bond? (1 Mark)

_____

b. An atom of element X has 16 protons, 16 neutrons and 16 electrons.

i. Name the element and give its symbol. (2 Marks)

_____

ii. Element **X** forms the ion $\mathbf{X^{-2}}$. How many protons, neutrons and electrons are there in this ion? (1 Mark)

_____

iii. There is another isotope of this element with mass number 35. How many protons, neutrons and electrons are there in an atom of this isotope? (1 Mark)

_____

Q.2. (Total 6 Marks)

a. The table below relates scientists to their contribution. Complete spaces **A** and **B**. (2 Marks)

Scientists	**Contribution**
A	Prepare alcohol by fermentation
Al-Beruni	**B**

A = _____

B = _____

b The word equation shows the reaction for hydrogen peroxide.

Hydrogenperoxide $\rightarrow$ *Oxygen* + *Water*

i. Write a balanced chemical equation for the above reaction. (2 Marks)

_____

ii. Identify and define the type of reaction. (2 Marks)

_____

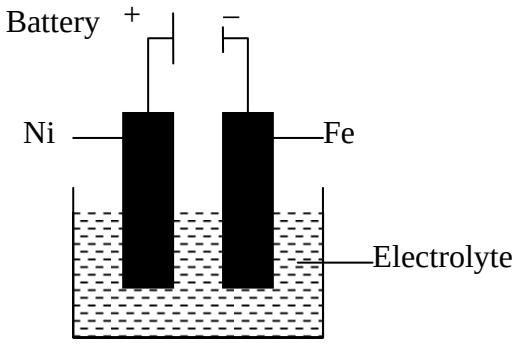
_____

_____

_____

Q.3. (Total 8 Marks)

a. Electrolysis can be used to electroplate other metals. The diagram shows the process of nickel - plating.



i. Suggest a suitable solution to use as an electrolyte. (1 Mark)

ii. Write down FOUR conditions that should be met by an effective electrolyte. (2 Marks)

b. A person is having an acute pain in the stomach due to indigestion.

i. What is the cause of indigestion? (1 Mark)

ii. Write a word equation for the reaction that takes place in the stomach if the person takes baking soda to cure indigestion? (1 Mark)

iii. Which process is involved in the above real life example? (1 Mark)

c. In the following reaction

$$H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$$

Which part of reaction is endothermic and which part is exothermic? Explain your answer with a reason. (2 Marks)

Q.4. (Total 3 Marks)

a. Define solubility. (1 Mark)

b. 2.9gms of K_2SO_4 was dissolved in 25cm^3 of water. The first crystals appeared at 31°C.What is its solubility at 31°C? (2 Mark)

Space for Calculations

Q.5. (Total 5 Marks)

EITHER

a. Define electron affinity and its trends in the periodic table.

OR

b. Describe any FIVE properties of Cathode rays produced in the discharge tube experiment.

Q.6. (Total 5 Marks)

EITHER

a. Describe the difference between a solution and a suspension in the light of the following properties;

I-Visibility II- Separation III- Filterability IV- Diffusion V- Settling

OR

b. What is diffusion? Explain it in terms of gases and liquids. Give one example of each.

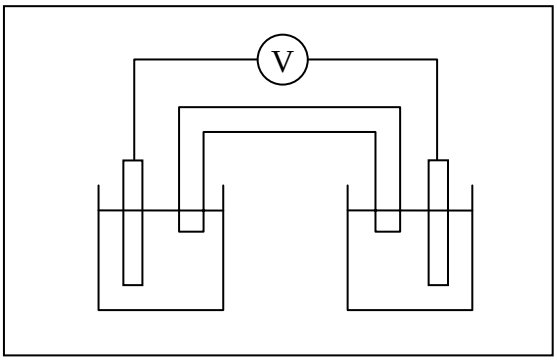
Q.7. (Total 5 Marks)

EITHER

a. Explain the Solvay-ammonia process with the help of chemical equations.

OR

b. Which type of cell is shown in the figure given below? Explain the process briefly with the help of equations.



END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION 2010

Chemistry Paper II

Time allowed: 2 hours 25 minutes Marks 40

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign that it is correct.

I agree that this is my name and school. **Candidate's signature**

2. RUBRIC. There are EIGHT questions. Answer ALL EIGHT questions. Questions 6, 7 & 8 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 4 Marks)

Empirical formula shows the simplest whole number ratio between atoms present in a compound.

Calculate the empirical formula of a compound that contains 22% carbon, 4.6 % hydrogen and 73.4 % bromine by mass. (Hint: Atomic mass of bromine =80 amu)

Space for Calculation

Q.2. (Total 5 Marks)

A sketch of periodic table series is given below.

Na	Mg	Al	Si	P	S	Cl	Ar

a. Predict the period number to which the given series of elements belongs. (1 Mark)

_____

_____

b. Which of the given elements has the smallest atomic radius? (1 Mark)

_____

_____

c. Which of the given elements shows the highest electronegativity? (1 Mark)

_____

_____

d. Which of the given elements will ionize easily? Give a reason for your answer. (2 Marks)

_____

_____

_____

_____

Q.3. (Total 6 Marks)

a. Magnesium chloride has a high melting and boiling point due to the presence of strong electrostatic force of attraction.

Explain why:

i. A magnesium ion has a charge of +2. (1 Mark)

_____

_____

ii The ions of magnesium chloride stay together . (1 Mark)

_____

_____

iii Magnesium chloride has no overall charge. (1 Mark)

_____

_____

iv. The formula of magnesium chloride is $MgCl_2$. (1 Mark)

_____

_____

b. When you come back from school and enter the kitchen, you smell the cooking aroma.

Name and define the process which makes it possible to smell the cooking aroma. (2 Marks)

_____

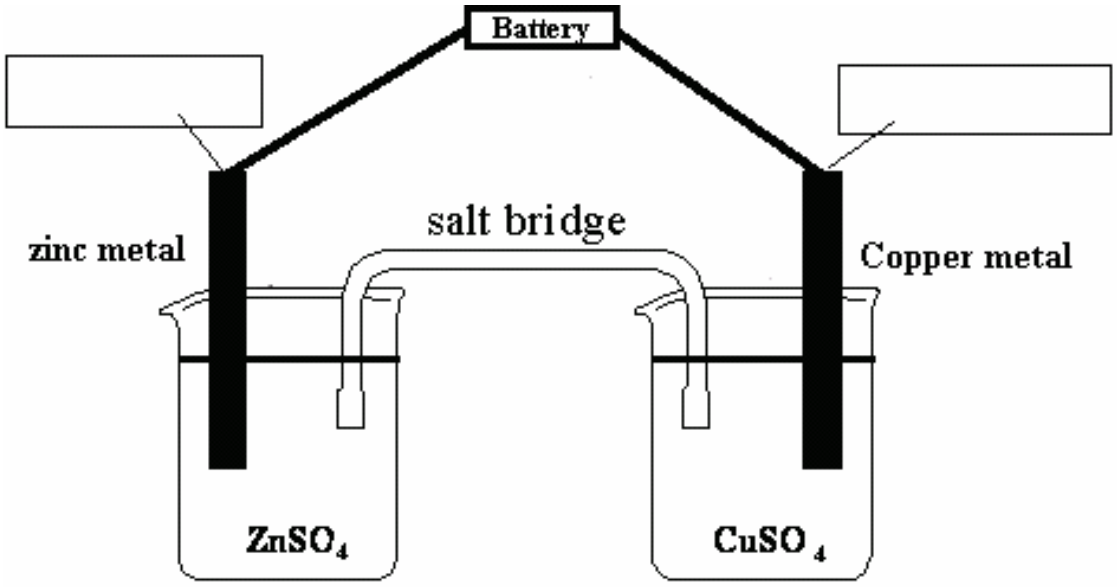
_____

_____

_____

Q.4. (Total 6 Marks)

a. A sketch of Daniel cell is given below.



i. Label the cathode and anode in the given diagram. (1 Mark)

ii. Show the flow of current with the help of arrows. (1 Mark)

iii. Identify at which electrode the oxidation occurs. (1 Mark)

_____

_____

iv. Give ONE use of the Daniel cell. (1 Mark)

_____

_____

b. Give the reason for the following cases. (2 Marks)

S.No	Cases	Reasons
i.	NaCl is soluble in HCl.	
ii.	Benzene is insoluble in water.	

Q.5. (Total 4 Marks)

a. Sodium is placed in group IA.

Support your answer by giving any TWO reasons. (2 Marks)

_____

_____

_____

_____

b. Write the complete balanced chemical equations for the following reactions.

i. Sodium reacts with cold water. (1 Mark)

_____

_____

ii. Sodium reacts with hydrochloric acid. (1 Mark)

_____

_____

Q.6. (Total 5 Marks)

EITHER

a. Write FIVE conclusions drawn by Rutherford after bombarding alpha particles from a gold foil.

OR

b. Classify mixtures and compounds from the given list. Based on the classification, give FOUR differences between mixtures and compounds.

Brass, Zinc sulphide, Soil, Water, Air

Q.7. (Total 5 Marks)

EITHER

a. Define covalent bond. Explain the THREE types of covalent bond with ONE example each.

OR

b. A bicycle pump contains $50\,cm^3$ of air at a pressure of $1 x 10^5$ pa .What would be the volume of the air if the pressure was increased to $2.1 x 10^5$ pa at constant temperature? Also state Boyle's law.

Q.8. (Total 5 Marks)

EITHER

a. A solution of sodium hydroxide is made by dissolving 22.5 grams of the salt in 500 cm^3 of the solution. Find the concentration of the solution in gm/dm^3 and mol/dm^3.

OR

b. Explain the electrolytic refining of copper with the help of construction, working and half cell reactions.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2011

Chemistry Paper II

Time allowed: 2 hours 25 minutes Marks 40

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign that it is correct.

I agree that this is my name and school. **Candidate's signature**

2. RUBRIC. There are EIGHT questions. Answer ALL EIGHT questions. Questions 6, 7 & 8 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
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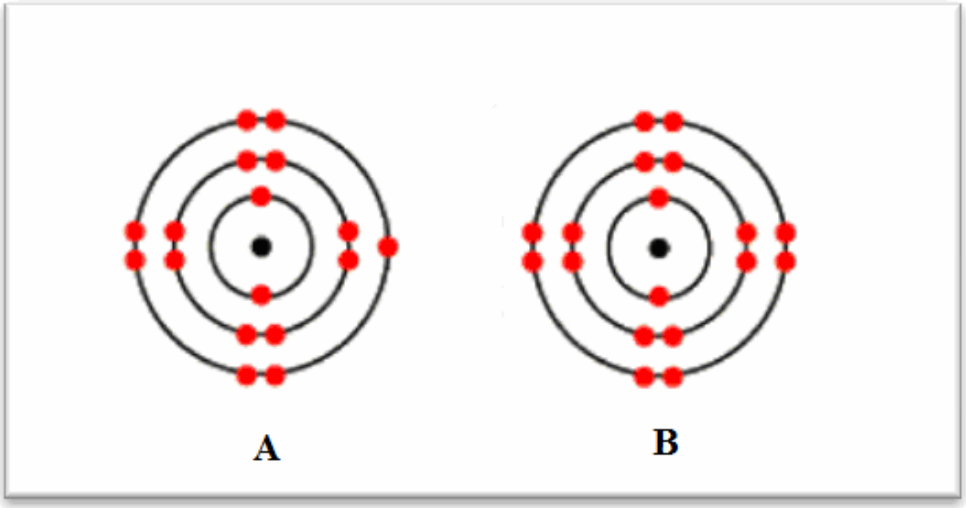
4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 4 Marks)

The figure below shows the atomic structure of an element.



i. Identify which figure represents the chloride ion and also give the definition of an ion. (2 Marks)

ii. What charge will be present on a chloride ion? Explain giving a reason. (2 Marks)

Q.2. (Total 5 Marks)

a. A group of the periodic table is given below.

2 He 4.0026
10 Ne 20.179
18 Ar 39.948
36 Kr 83.80
54 Xe 131.30

Identify the group of the periodic table. Also explain why a group has similar properties. (2 Marks)

b. Which properties tend to decrease from top to bottom within a group? Give your answer with the help of an appropriate reason. (3 Marks)

Q.3. (Total 6 Marks)

a. Identify the following as ionic, covalent and co-ordinate covalent compounds. (4 Marks)

S.No	Compound	Type
1.	Ammonia	
2.	Cesium chloride	
3.	Hydrogen chloride	
4.	Sulphur dioxide	

b. What happens to the rate of evaporation when a liquid is heated? Also give a reason to explain your answer. (2 Marks)

_____

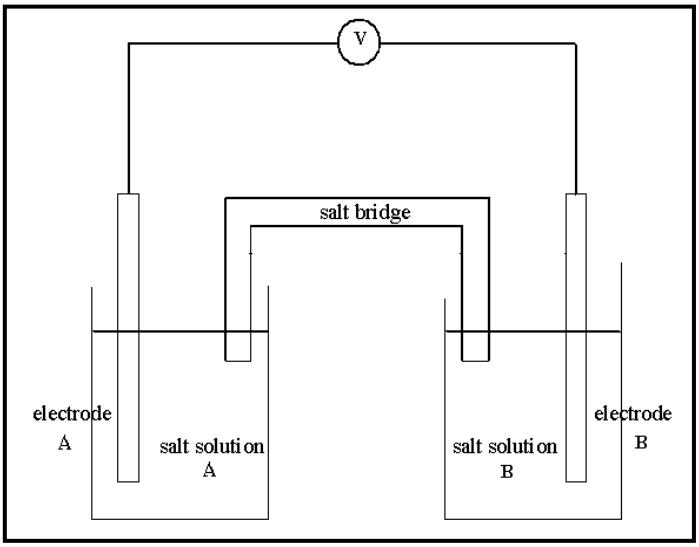
_____

_____

_____

Q.4. (Total 6 Marks)

a. An electrochemical cell is shown in the diagram. Students try using zinc, lead, magnesium and copper as electrodes.



i. Which TWO metals do you expect to give the highest reading on a voltmeter placed in the circuit? Explain your choice with the help of an appropriate reason. (2 Marks)

_____

_____

_____

_____

ii. If copper and zinc are used as electrodes, what would you expect to see happening round the copper electrode? (1 Mark)

_____

_____

b. Differentiate between the following types of solution. Also give ONE example. (3 Marks)

S.No	True Solution	Colloidal Solution
1.		
Example		

Q.5. (Total 4 Marks)

a. Classify the following elements as alkali and alkaline earth metals in the grid. (2 Marks)

Elements:	**Al**	**Ca**	**P**	**Na**

Alkali Metal	**Alkaline Earth Metals**

b. What happens when the above alkali and alkaline earth metals react with halogens? Answer the question with the help of a balanced chemical equation. (2 Marks)

S.No	**Metals**	**Reaction With Halogens**
1.	**Alkali Metal**	**With Fluorine**
2.	**Alkaline Earth Metal**	**With Chlorine**

Q.6. (Total 5 Marks)

EITHER

a. Balance the following chemical equations with the help of inspections and trial and error method.

1. $Al_{(s)} + HCl_{(aq)} \rightarrow AlCl_{3(aq)} + H_{2(g)}$
2. $Zn_{(s)} + Fe_2O_{3(s)} \rightarrow Fe_{(s)} + ZnO_{(s)}$
3. $C_2H_5OH_{(l)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(l)}$
4. $NO_{2(g)} + O_{2(g)} + H_2O_{(l)} \rightarrow HNO_{3(l)}$
5. $Na_2CO_{3(s)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$

OR

b. Describe briefly the structure of an atom with the help of its sub atomic particles.

Q.7. (Total 5 Marks)

EITHER

a. Describe the formation of co-ordinate covalent bond by using an example of ammonium chloride.

OR

b. Write down any FIVE differences between the crystalline and amorphous solids.

Q.8. (Total 5 Marks)

EITHER

a. Write any FIVE differences between electrolytic and voltaic cell.

OR

b. How many millilitres of aqueous 2M KCl solution must be diluted with water to prepare 100 ml of aqueous 0.4M KCl? What do you mean by diluting a solution?
(Hint:Atomic mass of K= 39 amu)

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2012

Chemistry Paper II

Time allowed: 2 hours 25 minutes Marks 40

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign that it is correct.

I agree that this is my name and school. **Candidate's signature**

2. RUBRIC. There are EIGHT questions. Answer ALL EIGHT questions. Questions 6, 7 & 8 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 4 Marks)

a. Environmental chemists have expressed their concerns about the depletion of ozone layer. Increased quantities of chlorofluorocarbons are carried by convection of currents to the stratosphere, where they absorb ultraviolet radiations and react with ozone.

$$CFCl_3 \rightarrow CFCl_2^{\bullet} + Cl^{\bullet}$$
$$Cl^{\bullet} + O_3 \rightarrow ClO^{\bullet} + O_2$$
$$ClO^{\bullet} + O \rightarrow Cl^{\bullet} + O_2$$

Classify $Cl^{\bullet}$ and O_2 species as atom, molecule, free radical or ion. Give a reason for the identification of $Cl^{\bullet}$. (3 Marks)

Identification of $Cl^{\bullet}$: _____

Identification of O_2: _____

Reason for the identification of $Cl^{\bullet}$: _____

_____

_____

b. Cl_{17}^{35} and Cl_{17}^{37} are two isotopes of chlorine. What do you understand by the term isotopes? (1 Mark)

_____

_____

Q.2. (Total 5 Marks)

a. A local scientist had discovered an imaginary element having atomic number 18. She wanted to place it in the modern periodic table for which she wanted to know the group and period number of the imaginary element. (4 Marks)

i. Identify the period and group number of the imaginary element with the help of electronic configuration.

Electronic Configuration _____

Period Number _____

Group Number _____

ii. Write ONE characteristic of the above identified group.

_____

_____

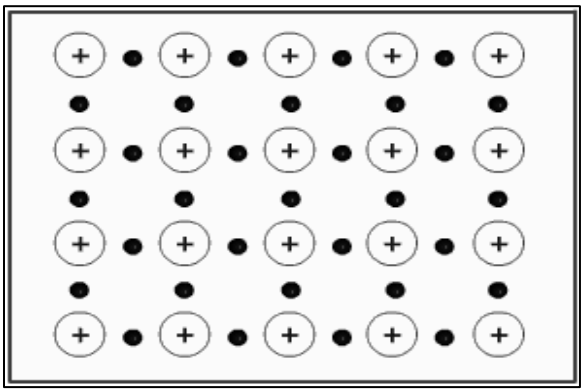
b. State in which order scientists have arranged the elements in a period in the modern periodic table. (1 Mark)

_____

_____

Q.3. (Total 6 Marks)

a. Copper metal is used to make electrical wires to conduct electricity. A general structure of the metal is shown below.



Answer the following questions with reference to the given figure.

i. Why are copper metal wires used to conduct electricity? (1 Mark)

_____

_____

ii. Which type of force of attraction is present in the given structure? Also give ONE characteristic of it. (2 Marks)

_____

_____

_____

_____

b. Explain the relationship of boiling point and vapour pressure. Also state the effect of external pressure on boiling point. (3 Marks)

_____

_____

_____

_____

_____

_____

Q.4. (Total 6 Marks)

a. Silver plating is done on copper utensils to make it shiny. The following redox reaction occurs during silver plating.

$$2AgNO_{3(aq)} + Cu_{(s)} \rightarrow Cu(NO_3)_{2(aq)} + 2Ag_{(s)}$$

i. Identify the reduced species in the given reaction. (1 Mark)

_____

_____

ii. Identify the change in the oxidation state of the reduced species. (1 Mark)

_____

_____

iii. Identify the reducing agent in the given reaction. Give a reason for your identification. (2 Marks)

_____

_____

_____

_____

b. A doctor prescribed milk of magnesia, a suspension of magnesium hydroxide, to a patient in order to be used as a neutralizer for stomach acidity.

How would you determine that milk of magnesia is a suspension? Give TWO reasons. (2 Marks)

_____

_____

_____

_____

Q.5. (Total 4 Marks)

Justify the following statement.

'The first ionization energy of group IIA is higher than group IA whereas the second ionization energy of group II A is lower than group I A.'

Q.6. (Total 5 Marks)

EITHER

a. A compound **X** contains 72 % carbon, 4 % hydrogen and 24 % oxygen. The molecular weight of the compound is 130 g. Calculate its empirical and molecular formula.

OR

b. Draw the atomic structure of the following elements and their ions. Mention the number of subatomic particles in each case. Also specify which of the following elements form a cation or an anion. (Hint: Fluorine ($^{19}_{9}F$) and Aluminium ($^{27}_{13}Al$))

i. Fluorine atom and fluoride ion ii. Aluminium and aluminium ion

Q.7. (Total 5 Marks)

EITHER

a. Describe the formation of a covalent bond between two unlike non- metallic elements. Also give the diagrammatic representation of the formation of the bond.

OR

b. Define allotrope and describe any TWO crystalline allotropic forms of carbon with reference to their crystalline structure.

Q.8. (Total 5 Marks)

EITHER

a. Define solubility and discuss any TWO factors which affect solubility with the help of an example.

OR

b. Describe the extraction of aluminium from alumina by using the process of electrolysis.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2013

Chemistry Paper II

Time: 2 hours 25 minutes Marks: 40

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's signature**

2. RUBRIC. There are SIX questions. Answer ALL questions. Questions 5 & 6 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 7 Marks)

a. $C_2H_4 + O_2 \Leftrightarrow CO_2 + H_2O$ (2 Marks)

i. Balance the given equation using the simplest possible whole numbers.

_____

_____

ii. How many moles of oxygen are required to react with 2.5 moles of ethene (C_2H_4)?

[Hint: Use balanced chemical equation for the calculation]

_____

_____

b. Draw the structures of any TWO isotopes of carbon specifying the number of protons, neutrons and electrons of each. (2 Marks)

Isotopes of Carbon	

c. Describe why sodium chloride has high melting and boiling points. (3 Marks)

Q.2. (Total 5 Marks)

a. Describe why electronegativity of elements increases from left to right in a period and decreases down a group in the periodic table. (4 Marks)

b. If an element belongs to group 17 and period 3 of the periodic table, what will be its electronic configuration? (1 Mark)

Q.3. (Total 9 Marks)

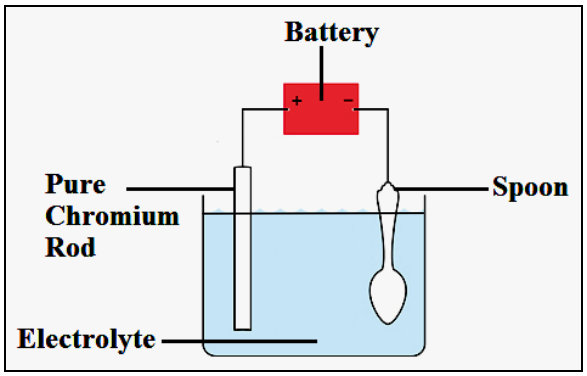
a. Kerosene oil and honey are both liquids. When added to water why does kerosene oil float over water while honey settles down? (2 Marks)

b. A student added potassium nitrate (KNO_3) in water and during dissolution of the salt he/she observed that the test tube became cold.

i. Describe why the test tube became cold. (2 Marks)

ii. What will happen to the solubility of this salt on increasing the temperature? (1 Mark)

c. The diagram below shows the electroplating of chromium.



i. Which of the two electrodes connected to the battery acts as a cathode? (1 Mark)

_____

_____

ii. Name the electrolyte used in the given electrolytic cell. (1 Mark)

_____

_____

iii. Show the reactions at cathode and anode using balanced chemical equations. (2 Marks)

Reaction at anode: _____

_____

Reaction at cathode:_____

_____

Q.4. (Total 4 Marks)

Give reasons for the following statements about metals and non-metals.

i. Non-metals do not react with dilute acids.

_____

_____

ii. Metals are electropositive in nature.

_____

_____

iii. Potassium is always found in nature as cations with +1 oxidation state.

_____

_____

iv. Fluorine is the most non-metallic among elements.

_____

_____

Q.5. (Total 8 Marks)

EITHER

a. Write any SIX characteristics in a tabular form distinguishing a compound from a mixture, giving ONE example of each.

OR

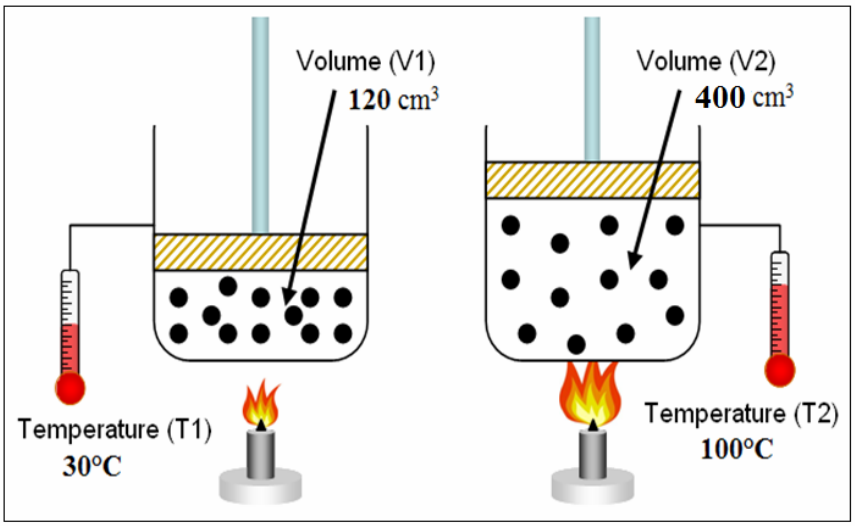
b. Describe the types of bonds and their formation in the following species. Also give ONE similarity between their bonds.

i. A water molecule (H_2O) ii. A hydronium ion (H_3O^+)

Q.6. (Total 7 Marks)

EITHER

a. The figure shows an experimental verification of a certain gas law with estimated values. Based on this experiment, describe the relevant gas law in detail showing mathematical and graphical representations of it.



OR

b. What is meant by the term ‘electroplating’? Describe in detail the electrolytic refining of impure copper showing reactions at anode and cathode with the help of chemical equations.

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2014

Chemistry Paper II

Time: 2 hours 25 minutes Marks: 40

INSTRUCTIONS

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4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 3 Marks)

There are three students A, B and C with a shared interest in Chemistry. However, they like to specialize in different branches of Chemistry studying at the University level. Identify in which branch of Chemistry each student will enroll as per his/her interest.

S. NO.	Interest	Branch of Chemistry
1.	**Student A** is interested in studying about the laws and principles governing the combination of atoms and molecules.	
2.	**Student B** likes to study about the compounds and metabolism of a living body.	
3.	**Student C** wants to learn about the changes occurring in the nuclei of atoms, accompanied by the emission of invisible radiations.	

Q.2. (Total 4 Marks)

a. Rutherford carried out a gold metal foil experiment based on which he made a conclusion that an atom consists of two parts: 1) Nucleus 2) Extra nuclear part. However, there were certain weaknesses in his atomic model which led to further experimentations by other scientists.

Mention TWO defects in Rutherford's atomic model. (2 Marks)

_____

_____

_____

_____

_____

_____

b. Draw an electronic dot and cross structure of calcium chloride (ionic compound) showing the arrangement of valence electrons with correct charges on the ions. [Hint: Atomic number of Ca = 20 and Cl = 17] (2 Marks)

Space for Structure:

Q.3. (Total 5 Marks)

An electronic configuration of an element is given below.

Electronic configuration: $1s^2, 2s^2, 2p^6, 3s^2, 3p^3$

a. Predict the group and period of the element. (2 Marks)

Group: _____

Period: _____

b. On what basis are elements arranged in the modern periodic table? Give any TWO differences between a group and a period. (3 Marks)

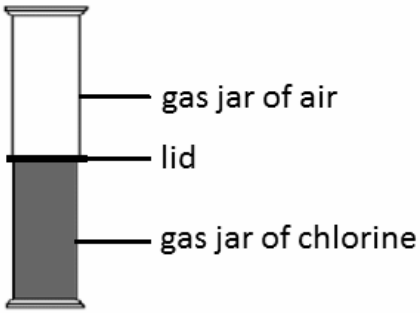
_____

_____

S. No.	Group	Period
1.		
2.		

Q.4. (Total 4 Marks)

a. A gas jar of air is placed over another gas jar containing a dense gas, chlorine. Both jars are separated by a lid as shown in the figure.



i. Name the phenomenon that will occur after the lid is removed. (1 Mark)

_____

_____

ii. Give a reason using the idea of particle why the phenomenon that you have identified in part (i) will occur. (1 Mark)

_____

_____

_____

b. A deep blue copper sulphate solution turns pale blue when water is added.

Name and describe the phenomenon that causes the change in colour from deep blue to pale blue. (2 Marks)

_____

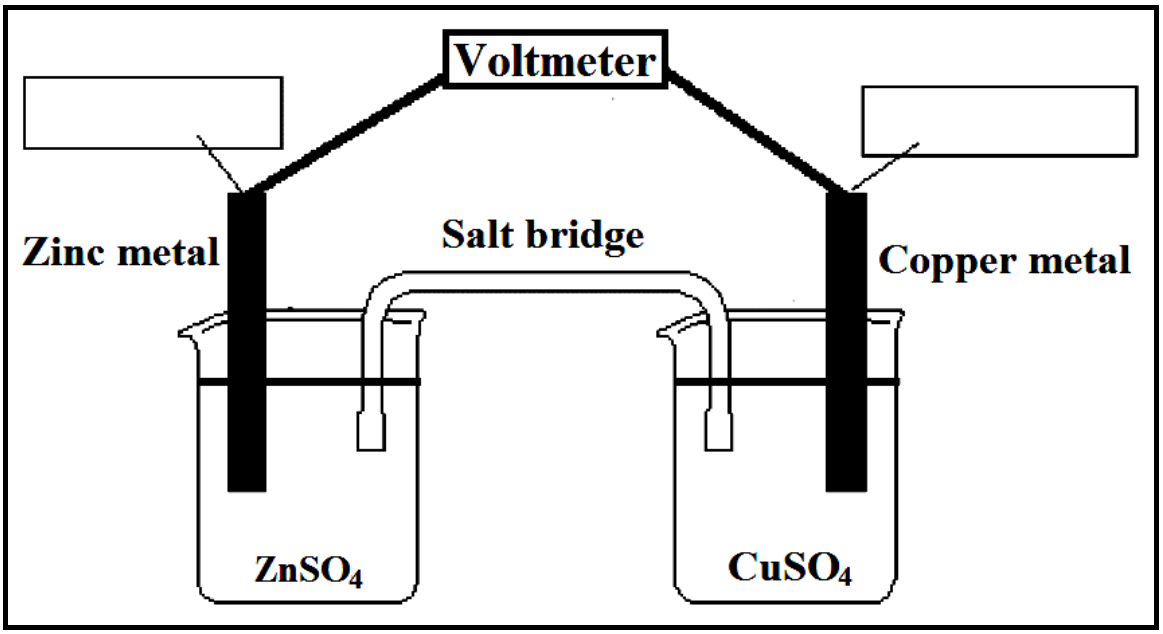
_____

_____

_____

Q.5. (Total 5 Marks)

a. A sketch of Daniel cell is given below.



i. Label the cathode and anode in the given diagram. (1 Mark)

ii. Show the flow of current with the help of arrows in the given diagram. (1 Mark)

iii. Identify at which electrode the process of oxidation occurs. (1 Mark)

b. NaOH is observed to be a strong electrolyte that conducts electricity.

i. What makes sodium hydroxide conduct electricity in aqueous solutions? (1 Mark)

_____

_____

_____

ii. Write a chemical equation to support your answer to part (i). (1 Mark)

_____

_____

Q.6. (Total 4 Marks)

Magnesium and calcium show similar chemical behaviour due to which they are placed in the same group of the periodic table. Their electronic configurations are as follows:

$_{12}Mg$	$1s^2,2s^2,2p^6,3s^2$
$_{20}Ca$	$1s^2,2s^2,2p^6,3s^2,3p^6,4s^2$

a. State the group to which Mg and Ca belong. (1 Mark)

b. Describe why the ionization energy of calcium is less than that of magnesium. (2 Marks)

c. What will be the product of the given reaction between magnesium oxide and water?

$MgO + H_2O \rightarrow ?$ (1 Mark)

Q.7. (Total 8 Marks)

EITHER

a. Identify and describe the types of chemical reaction shown in each of the given equations.

i. $2Mg + O_2 \rightarrow 2MgO$

ii. $H_2S + Cl_2 \rightarrow 2HCl + S$

iii. $2Zn(NO_3)_2 \xrightarrow{\Delta} 2ZnO + 4NO_2 + O_2$

iv. $C_2H_5OH + 3O_2 \xrightarrow{\Delta} 2CO_2 + 3H_2O$

OR

b. Give any ONE example of radioactive isotopes for each of the following fields and also describe the use of it.

i. Radiotherapy

ii. Medicine

iii. Archaeology and Geology

iv. Power generation in nuclear reactors

Q.8. (Total 7 Marks)

EITHER

a. Write any FIVE differences between amorphous and crystalline solids giving ONE example of each.

S. No.	Amorphous Solid	Crystalline Solid
1.		
2.		
3.		
4.		
5.		
Example:		

OR

b. Describe the manufacturing of sodium metal from fused sodium chloride using Down's cell. Write in detail the construction and working of Down's cell giving necessary chemical equations.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2015

Chemistry Paper II

Time: 2 hours 25 minutes Marks: 40

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4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 3 Marks)

$$\_\_\_ C_2H_{4(g)} + \_\_\_ O_{2(g)} \rightarrow \_\_\_ CO_{2(g)} + \_\_\_ H_2O_{(l)}$$

a. Balance the above equation using the simplest possible whole numbers. (1 Mark)

b. Identify the type of chemical reaction taking place in the above equation. (1 Mark)

_____

_____

c. How many moles of oxygen gas (O_2) are required to react with 3.5 moles of ethene gas (C_2H_4)?

[NOTE: Use the above balanced chemical equation for the calculation.] (1 Mark)

_____

_____

Q.2. (Total 4 Marks)

The table below shows the number of protons, electrons and neutrons for substances A, B, C and D.

Substance	Number of Protons	Number of Electrons	Number of Neutrons
A	17	18	18
B	15	15	16
C	11	10	12
D	6	6	7

Based on the given data, answer the following questions.

a. Identify the substances A to D according to the table below. (3 Marks)

Positive Ions	Negative Ions	Neutral Atoms

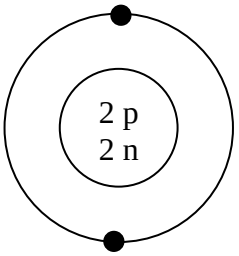
b. Give the letter of the substance which is an isotope of $^{12}_{6}C$. (1 Mark)

_____

_____

Q.3. (Total 5 Marks)

Consider the given structure of an atom of an element X to answer the following questions.



a. Identify the element X. (1 Mark)

_____

_____

b. Name another element belonging to the same group as element X. (1 Mark)

_____

_____

c. State any THREE properties that all the elements of this group have in common. (3 Marks)

_____

_____

_____

_____

_____

_____

Q.4. (Total 4 Marks)

Diamond and graphite are allotropes of carbon.

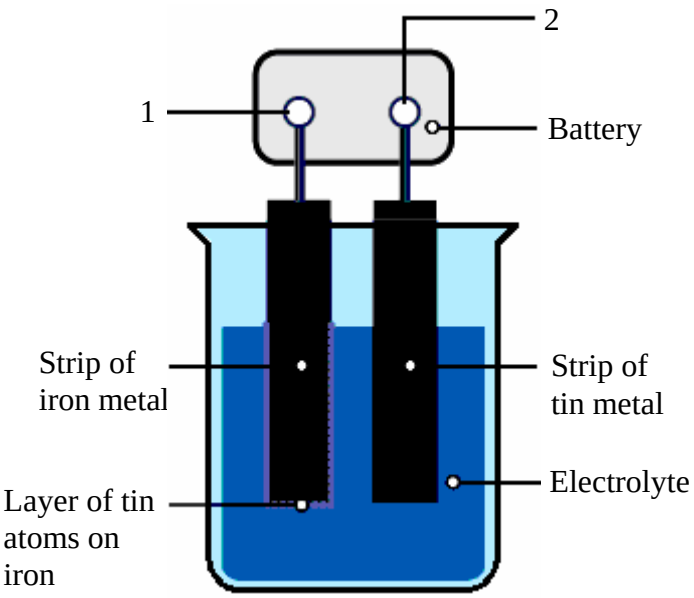
Diamond

Graphite

Distinguish between these two forms of carbon on the basis of their electrical conductivity. Also give an explanation for the difference.

Q.5. (Total 5 Marks)

a. In the electrolytic cell shown below, an iron strip is being plated with tin.



i. Identify the terminals 1 and 2 of the battery as positive or negative. (1 Mark)

Terminal 1 is _____

Terminal 2 is _____

ii. Suggest a suitable electrolyte for the above electroplating process. (1 Mark)

_____

_____

iii. Give a reason why an electrolyte is required for this process. (1 Mark)

_____

_____

b. In the given redox reaction, zinc can displace copper because zinc is more reactive than copper.

$$Zn_{(s)} + Cu(NO_3)_{2(aq)} \rightarrow Zn(NO_3)_{2(aq)} + Cu_{(s)}$$

Identify which substance acts as an oxidizing agent and which one acts as a reducing agent in the given reaction. (2 Marks)

Oxidizing Agent: _____

Reducing Agent: _____

Q.6. (Total 4 Marks)

a. Sodium ($_{11}$Na) and magnesium ($_{12}$Mg) are both metals. They react vigorously with chlorine to form ionic salts as shown in the following chemical reactions.

Sodium with chlorine: $2Na_{(s)} + Cl_{2(g)} \rightarrow 2NaCl_{(s)}$

Magnesium with chlorine: $Mg_{(s)} + Cl_{2(g)} \rightarrow MgCl_{2(s)}$

Describe why there is a difference between the formulae of both the ionic salts, i.e. NaCl and $MgCl_2$. (2 Marks)

b. Give TWO reasons why alkali metals are not found in a free state in nature. (2 Marks)

Q.7. (Total 8 Marks)

EITHER

a. A group of students classified four different substances into compounds or mixtures as follows.

Compound	Mixture
Distilled water	Soil
Carbon dioxide gas	Sea water

With reference to distilled water, carbon dioxide gas, soil and sea water, state FOUR characteristics of compounds and FOUR characteristics of mixtures that helped the students in their classification.

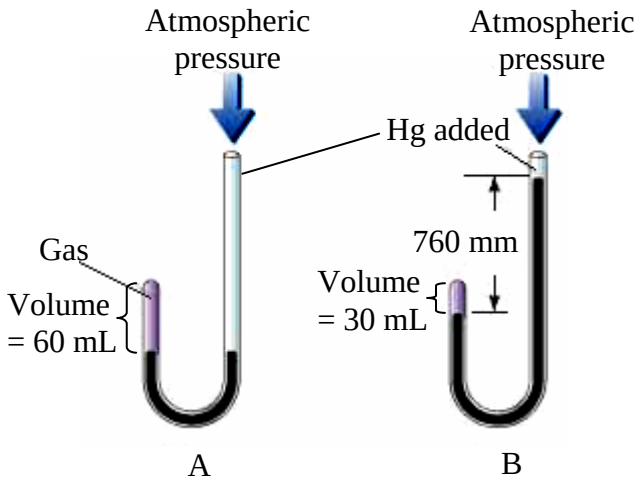
OR

b. Differentiate between polar and non-polar covalent bonds on the basis of electronegativity. Also describe the formation of a polar covalent bond in a hydrogen fluoride (HF) molecule on the basis of their valence shell electronic configuration. You may use diagram if you wish.

Q.8. (Total 7 Marks)

EITHER

a. Robert Boyle (1627-1691), an Irish chemist, performed the first quantitative experiment on gases using a J-shaped tube to study the relationship between the pressure of the trapped gas and its volume. He added mercury to the tube to study the effect of a change in pressure on the volume of the gas.



State Boyle's law. Give a mathematical expression and sketch a graph to represent Boyle's law. Use Boyle's law to explain the differences in the volume of gas observed in tube A and B above.

OR

b. Define solubility. With the help of examples, describe the effect of temperature and pressure on solubility of solids and gases.

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2016

Chemistry Paper II

Time: 2 hours 25 minutes Marks: 40

INSTRUCTIONS

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4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 4 Marks)

a. $C_3H_{8(g)} + 5O_{2(g)} \rightarrow 3CO_{2(g)} + 4H_2O_{(l)}$ (2 Marks)

How many grams of oxygen gas (O_2) will be required to react completely with 3 moles of propane gas (C_3H_8)?

(Note: Atomic mass of carbon = 12 amu, hydrogen = 1 amu and oxygen = 16 amu)

b. Balance the given chemical equations. (2 Marks)

i. $\_\_\_C_2H_{6(g)} + \_\_\_O_{2(g)} \rightarrow \_\_\_CO_{2(g)} + \_\_\_H_2O_{(l)}$

ii. $\_\_\_Cu_2S_{(s)} + \_\_\_O_{2(g)} \rightarrow \_\_\_Cu_2O_{(s)} + \_\_\_SO_{2(g)}$

Q.2. (Total 3 Marks)

How many protons, neutrons and electrons are there in the ion $^{31}_{15}P^{3-}$?

Ion	Number of Protons	Number of Electrons	Number of Neutrons
$^{31}_{15}P^{3-}$			

Q.3. (Total 5 Marks)

Following is a sketch of the modern periodic table showing a few representative elements. With reference to each element, answer the given questions.

Group →	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Period ↓								
1								He
2	Li	Be		C		O		
3			Al		P			

a. Identify the number of shells in an aluminium atom. (1 Mark)

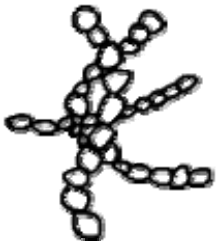
b. Why is beryllium less reactive than lithium? (1 Mark)

c. What happens to shielding effect of elements if we move across period 2 from left to right? (1 Mark)

d. Amongst the given elements, oxygen is the most electronegative. Why is helium not the most electronegative element? (1 Mark)

e. Which element has the lowest first ionisation energy? (1 Mark)

Q.4. (Total 4 Marks)

	
A	B

Identify the given allotropic forms of sulphur. Give ONE property of each.

A:_____

Property: _____

_____

_____

B: _____

Property: _____

_____

_____

Q.5. (Total 5 Marks)

a. Draw a labelled diagram of an electrolytic cell to show the electroplating of an iron nail with zinc. Your diagram should include: (3 Marks)

i. Name of the electrolyte

ii. Chemical equation to show the chemical change that occurs at anode

b. Why is iron nail used as cathode? (1 Mark)

_____

_____

c. What is the benefit of electroplating iron nail with zinc? (1 Mark)

_____

_____

Q.6. (Total 4 Marks)

Identify the given elements as either an alkali metal or an alkaline earth metal.

i. Beryllium: _____

ii. Rubidium: _____

iii. Radium: _____

iv. Barium: _____

Q.7. (Total 8 Marks)

EITHER

a.

i. What are isotopes?

ii. Name three types of isotopes of carbon.

iii. Draw the atomic structures of three isotopes of carbon specifying their number of protons, neutrons and electrons.

OR

b.

i. Draw dot and cross structures of the given species and identify the type of bonding present in each.

ii. Write any FOUR characteristics of ionic compounds.

Species	Dot and Cross Structure	Type of Bond
NH_4^+		
Li_2O		

Q.8. (Total 7 Marks)

EITHER

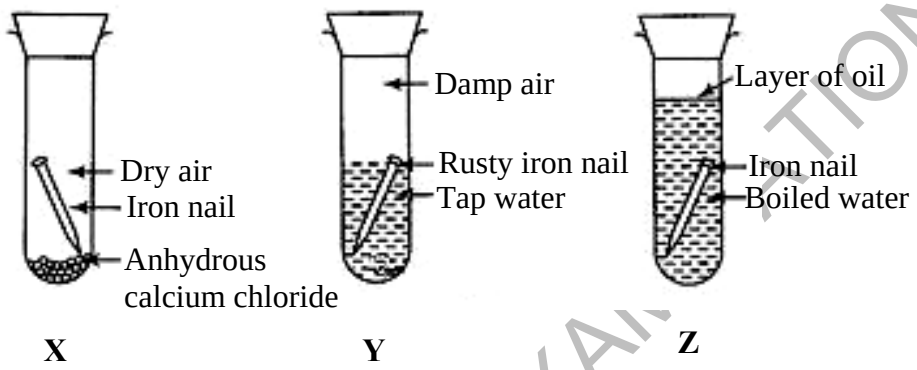
a. A student takes equal volume of water in three beakers **X**, **Y** and **Z**. She then mixes talcum powder in beaker **X**, egg albumen in beaker **Y** and ethanol in beaker **Z**.

i. Using the terms solution, suspension and colloid, identify the type of solution formed in each beaker **X**, **Y** and **Z**. Each term can be used once, twice or not at all.

ii. Write any FOUR distinguishing characteristics of solutions **Y** and **Z**.

OR

b. Identical iron nails are kept in three test tubes **X, Y** and **Z** as shown below.



X **Y** **Z**

i. Why does the iron nail in test tube **Y** becomes rusty but the ones in test tubes **X** and **Z** remain unaffected? Explain with reference to each test tube.

ii. Describe any TWO methods used in everyday life to prevent iron objects from rusting.

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

APRIL/ MAY 2017

Chemistry Paper II

Time: 2 hours 25 minutes Marks: 40

INSTRUCTIONS

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4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 3 Marks)

Given below is a chemical equation showing the reaction between magnesium ribbon and oxygen gas.

$$Mg_{(s)} + O_{2(g)} \rightarrow \mathbf{X}$$

a. Identify the product **X** and balance the given chemical equation. (2 Marks)

_____

_____

_____

_____

b. Name the type of chemical reaction taking place in this equation. (1 Mark)

_____

_____

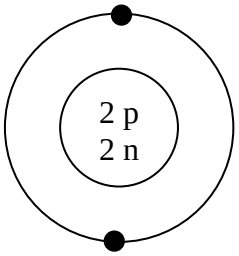
Q.2. (Total 4 Marks)

Complete the table for the given substances.

Substance	Dot and Cross Diagram
Oxygen gas	
Nitrogen gas	
Methane gas	
Carbon dioxide gas	

Q.3. (Total 5 Marks)

Consider the given structure of an atom of an element **X** to answer the following questions.



a. Identify the element **X**. (1 Mark)

_____

_____

b. Name another element belonging to the same group as element **X**. (1 Mark)

_____

_____

c. State any THREE properties that all the elements of this group have in common. (3 Marks)

_____

_____

_____

_____

_____

_____

Q.4. (Total 5 Marks)

a.

i. State the relationship between volume and temperature of a gas presented by J. Charles. (1 Mark)

ii. Give mathematical representation of Charles's law to support your answer in part **i**. (1 Mark)

b. A doctor prescribed milk of magnesia, a suspension of magnesium hydroxide, to a patient in order to be used as a neutraliser for stomach acidity.

How would you determine that milk of magnesia is a suspension? Give THREE reasons. (3 Marks)

Q.5. (Total 4 Marks)

a. 150 cm^3 of an aqueous sodium chloride solution contains 3 g sodium chloride. Calculate the mass/volume percentage of the given solution. (2 Marks)

b. If 15 cm^3 of 5 M hydrochloric acid solution has been diluted to 100 cm^3, then what will be the molarity of the prepared solution? (2 Marks)

Q.6. (Total 4 Marks)

An element **X** has relative atomic number of 11. It loses one electron and acquires +1 oxidation state. It gives a violent reaction with cold water.

a. Identify element **X** based on the given characteristics. (1 Mark)

b. Which period of the periodic table does element **X** belong to? (1 Mark)

c. What products are formed on reaction of element **X** with cold water? (2 Marks)

Q.7. (Total 8 Marks)

EITHER

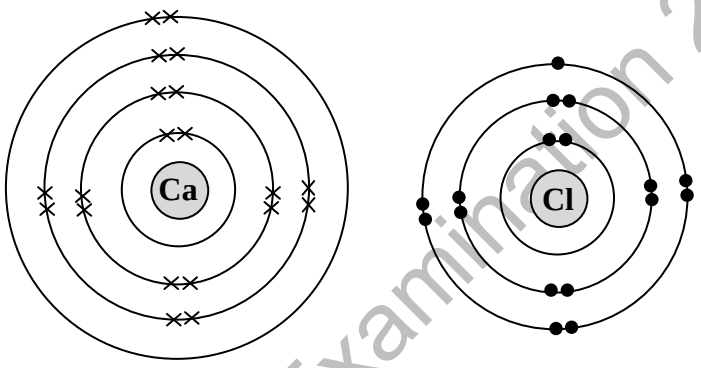
a.

i. Mention any FOUR medical uses of isotopes of any element. (4 Marks)

ii. Draw the atomic structures of three isotopes of oxygen, specifying their number of protons, neutrons and electrons. (4 Marks)

OR

b. Given are the atomic structures of calcium and chlorine. These two elements form a compound called calcium chloride.



i. Name the bond that joins calcium and chlorine atoms together. (1 Mark)

ii. Explain the formation of bond between calcium and chlorine atoms. (6 Marks)

iii. Draw a dot and cross diagram to represent the bond in calcium chloride. (1 Mark)

Q.8. (Total 7 Marks)

EITHER

a.

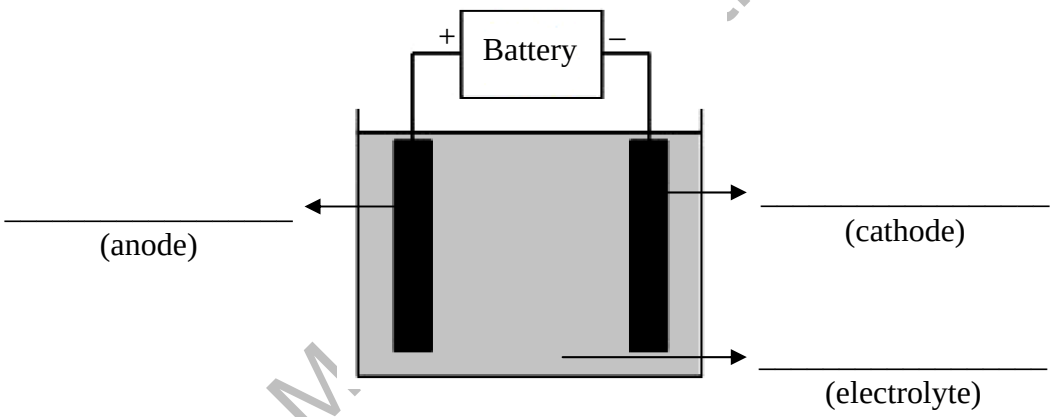
i. Define amorphous and crystalline solids. (2 Marks)

ii. Differentiate between gases and solids on the basis of the following properties. (5 Marks)

- Volume
- Compressibility
- Density
- Boiling point
- Ease of flow

OR

b. The given diagram shows an electrolytic cell that is used for refining of copper.



i. Name the anode, cathode and electrolyte used for the given electrolytic cell. (3 Marks)

ii. How is copper purified through the process of electrolytic refining? Support your answer using balanced chemical equation for the reactions occurring at the anode and the cathode. (4 Marks)

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

APRIL/ MAY 2018

Chemistry Paper II

Time: 2 hours 25 minutes Marks: 40

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4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 4 Marks)

A student has incorrectly identified the branches of chemistry according to the descriptions given in his assignment.

Read the descriptions carefully and write the correct name of the branch of chemistry in the next column.

S. No.	Description	Incorrect Name of the Branch	Correct Name of the Branch
1.	A subfield of chemistry dealing with radioactivity. It includes the study of the production and use of radioactive sources for a range of processes.	Physical Chemistry	
2.	The study of chemical processes within and relating to living organisms.	Environmental Chemistry	
3.	It deals with the qualitative and quantitative determination of chemical components of substances.	Organic Chemistry	
4.	The branch of chemistry which applies physical and chemical processes for the transformation of raw materials into products on a large scale that are of benefit to humanity.	Nuclear Chemistry	

Q.2. (Total 3 Marks)

An atom of an element **X** has atomic number 12 and mass number 24. It loses 2 electrons from its outer most shell and acquires a +2 charge.

Draw the atomic structure of the ion of element **X**.

Space for drawing

Q.3. (Total 5 Marks)

a. Define electronegativity. (1 Mark)

b. Describe with reasons,

i. the change in electronegativity across the period in the periodic table. (2 Marks)

ii. the trend in shielding effect when going down a group of the periodic table. (2 Marks)

Q.4. (Total 5 Marks)

a. There are two similar tea bags. One is placed in a cup of hot water while the other is placed in a cup of cold water.

i. In which cup will the water turn brown more quickly? (1 Mark)

_____

_____

ii. Explain your answer to part **i** with reference to the movement of particles. (2 Marks)

_____

_____

_____

_____

b. A solution of copper (II) sulphate in water is saturated at 70°C. What will happen if the solution is cooled to 20°C? Give a suitable reason for your answer. (2 Marks)

_____

_____

_____

_____

Q.5. (Total 4 Marks)

During an experiment, $MgBr_2$ and NaCl salts in their molten form are electrolysed in separate electrolytic cells.

Illustrate the reaction at anode and cathode in each electrolytic cell using balanced chemical equations.

a. $MgBr_2$ (2 Marks)

At the anode:

_____

_____

At the cathode:

_____

_____

b. NaCl (2 Marks)

At the anode:

_____

_____

At the cathode:

_____

_____

Q.6. (Total 4 Marks)

Give reasons why:

a. Mercury is used in thermometers. (1 Mark)

_____

_____

b. Silver is used in making jewellery. (1 Mark)

_____

_____

c. Copper is used to make water pipes. (1 Mark)

_____

_____

d. Reaction mixture of sodium and water turns red litmus paper to blue. (1 Mark)

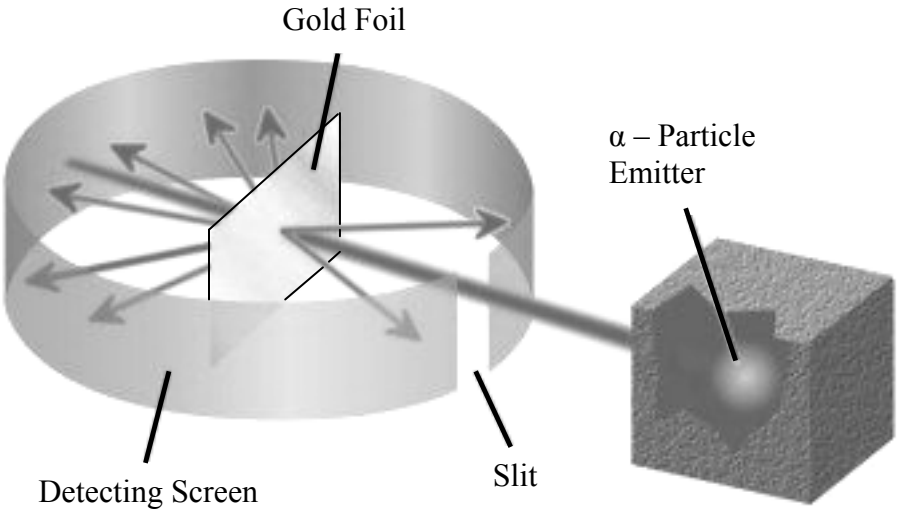
_____

_____

Q.7. (Total 8 Marks)

EITHER

a. In 1911, a scientist proposed planetary model for an atom based on the given illustration of gold foil experiment.



i. Name the scientist who carried out the gold foil experiment. (1 Mark)

ii. Based on the given experiment, describe the FIVE main points of the planetary model of the atom as concluded by the scientist identified in part **i**. (5 Marks)

iii. Mention the TWO fundamental defects in the planetary model of the atom. (2 Marks)

OR

b.

i. Name and describe the types of bonds and their formation in the following species. (7 Marks)

I. A water molecule (H_2O)

II. A hydronium ion (H_3O^+)

ii. Mention ONE similarity between the bonds identified in part **i**. (1 Mark)

Q.8. (Total 7 Marks)

EITHER

a.

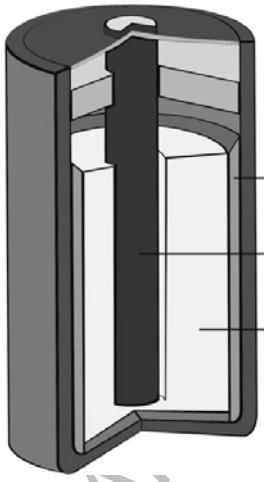
i. Describe the density of solids and gases based on the strength of intermolecular forces present among their particles. (4 Marks)

ii. Differentiate between amorphous and crystalline solids on the basis of the following properties. (3 Marks)

- Geometrical shape
- Melting points
- Symmetry

OR

b. Given below is zinc-carbon battery.



i. What is the anode, cathode and electrolyte made up of in the given dry cell battery? (3 Marks)

ii. How does the zinc-carbon battery work? Support your answer using balanced chemical equation for the reactions occurring at the anode and the cathode. (4 Marks)

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

APRIL/ MAY 2019

Chemistry Paper II

Time: 2 hours 15 minutes Marks: 35

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are EIGHT questions. Answer ALL questions. Questions 7 & 8 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

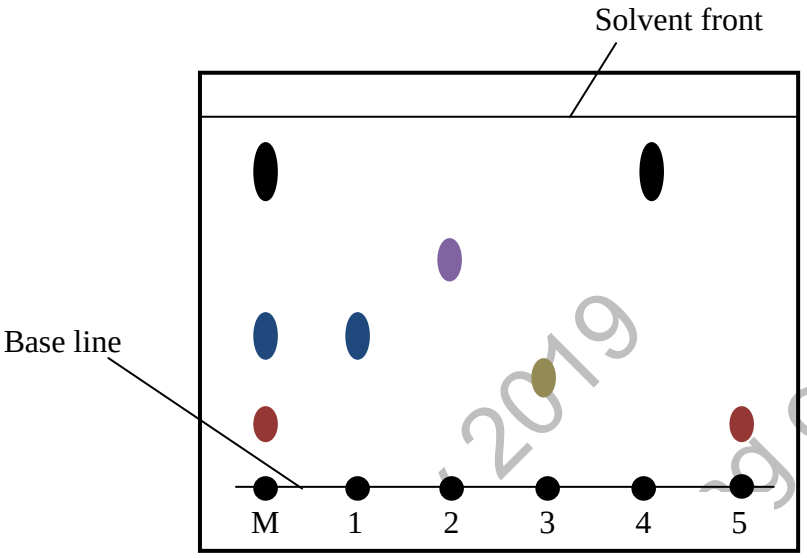
5. You may use a simple calculator if you wish.

Q.1. (Total 4 Marks)

State any FOUR characteristics of an ionic compound.

Q.2. (Total 4 Marks)

An analytical chemist uses chromatography to investigate the types of amino acids present in a mixture of amino acids. He represents the mixture as M, and the known amino acids as 1, 2, 3, 4 and 5. During experimentation, he ensures that the base line containing spots is placed above the solvent level. After experimentation, he sprays the chromatogram with a solution of ninhydrin. The given chromatogram shows his investigation result.



Chromatogram

a. Why is the base line containing spots placed above the solvent level? (1 Mark)

b. What is the purpose of spraying ninhydrin solution on chromatogram? (1 Mark)

c. Based on his investigation, identify the amino acids which are present in the mixture. (2 Marks)

Q.3. (Total 4 Marks)

Write a reason for each of the following periodic trends observed in the periodic table.

a. Electronegativity increases across the period. (1 Mark)

_____

_____

b. Shielding effect increases down the group. (1 Mark)

_____

_____

c. Atomic radius decreases across the period. (1 Mark)

_____

_____

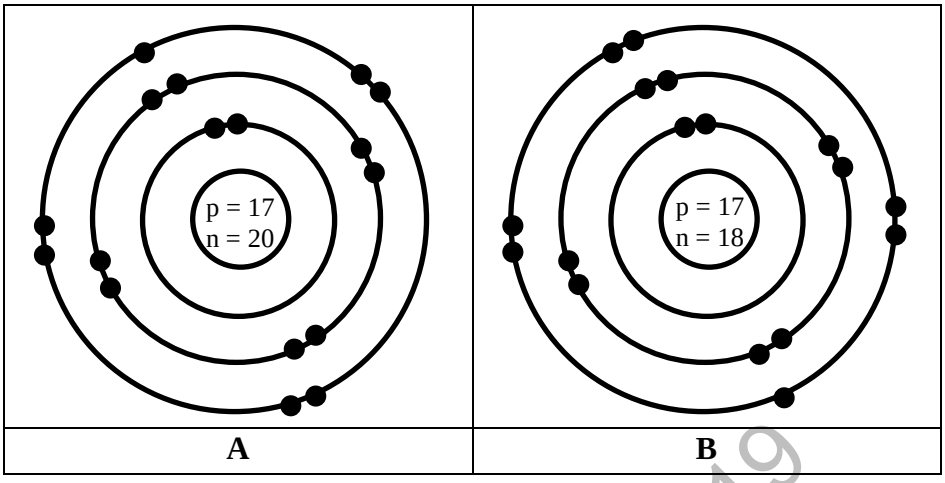
d. Ionisation energy decreases down the group. (1 Mark)

_____

_____

Q.4. (Total 3 Marks)

Write any ONE similarity and TWO differences between the given atoms **A** and **B**.



Similarity between atoms **A** and **B**: _____

_____

_____

Differences between atoms **A** and **B**: _____

_____

_____

_____

_____

Q.5. (Total 3 Marks)

Consider a closed container with liquid having weak intermolecular forces. This liquid experiences both, vapour pressure and boiling point at constant temperature.

a. Describe the effect of presence of weak intermolecular forces on the vapour pressure of the liquid. (2 Marks)

_____

_____

_____

_____

b. Relate the vapour pressure (described in part a) with the boiling point of the liquid. (1 Mark)

_____

_____

Q.6. (Total 3 Marks)

Give a scientific reason why gold is

a. used in making jewellery. (1 Mark)

_____

_____

b. alloyed with copper when making jewellery. (1 Mark)

_____

_____

c. extensively used in dentistry. (1 Mark)

_____

_____

Q.7. (Total 7 Marks)

EITHER

a. A compound contains 24% carbon, 12% hydrogen and 64% oxygen by mass. The relative molecular mass of this compound is 50.057 g/mol.

i. Calculate the empirical formula of the given compound. (5 Marks)

ii. Determine its molecular formula. (2 Marks)

(**Note**: Atomic mass of C = 12 amu, H = 1 amu and O = 16 amu)

OR

b. Given below are four elements.

Non-Metal	Metal
Chlorine ($^{35}_{17}$Cl)	Magnesium ($^{24}_{12}$Mg)
Oxygen ($^{16}_{8}$O)	Potassium ($^{39}_{19}$K)

i. Identify TWO elements from the given table which, when form ions, show the same electronic arrangement as a neon ($^{20}_{10}$Ne) atom. (2 Marks)

ii. Illustrate the formation of an ionic compound using the elements identified in part i with the help of dot and cross structure of the compound. (5 Marks)

Q.8. (Total 7 Marks)

EITHER

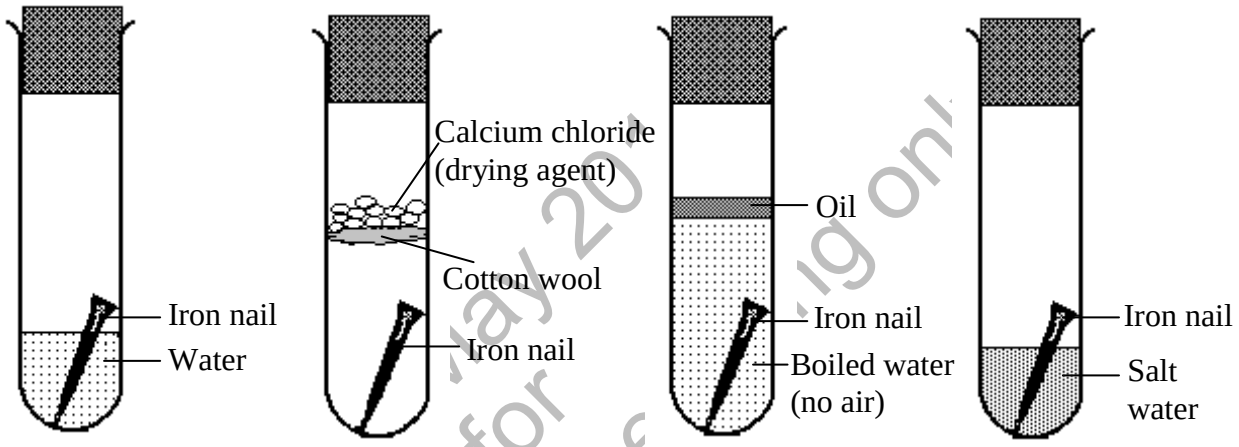
a.

i. Describe the arrangement and movement of particles in solids, liquids and gases. (6 Marks)

ii. What happens to the particles during effusion in gases? (1 Mark)

OR

b. The given diagram shows different conditions to investigate rusting of iron.



i. In which of the given test tubes, **I** to **IV**, will the iron nail rust? Explain why the iron nail rusts in the identified test tube(s) and not in others. (6 Marks)

ii. Why is the process of rusting a redox reaction? (1 Mark)

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

ANNUAL EXAMINATIONS (THEORY) 2023

Chemistry Paper II

Time: 1 hour 50 minutes Marks: 25

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are SIX questions. Answer ALL questions. Questions 5 & 6 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 3 Marks)

Draw the structure of an ion with the following features.

- Charge of −3
- Atomic number = 15
- Nucleon number = 31

Space for drawing

Q.2. (Total 3 Marks)

Complete the following blanks with reference to the physical properties of labelled elements.

F
Cl ——— Odour = _____
Br ——— Physical State at Room Temperature = _____
I ——— Colour = _____
At

Q.3. (Total 3 Marks)

When ammonium chloride (NH_4Cl) is heated in a test tube, it results in the formation of ammonia (NH_3) and hydrogen chloride (HCl) gases. The fumes of the gases can be observed moving along the test tube.

(**Note**: Atomic mass of N = 14 amu, H = 1 amu and Cl = 35.5 amu)

a. Name the process that allows the movement of gases along the test tube. (1 Mark)

b. Which gas, ammonia or hydrogen chloride, will travel at a faster speed? Give a suitable reason to support your answer. (2 Marks)

Q.4. (Total 4 Marks)

When a piece of Mg ribbon is lit, it burns with a dazzling white light. The combination of Mg with oxygen produces a white substance.

a. Identify the element that has the symbol Mg. (1 Mark)

b. Write a balanced chemical equation to show the given chemical reaction. (2 Marks)

c. Which type of bond is formed in the product of this reaction? (1 Mark)

Q.5. (Total 6 Marks)

EITHER

a. An experiment shows that a compound **Y** contains 80% carbon and 20% hydrogen by mass. If the relative molecular mass of this compound is 30.07 g/mol, then

i. calculate the empirical formula of the compound **Y**. (3 Marks)

ii. determine its molecular formula. (3 Marks)

(**Note**: Atomic mass of C = 12 amu and H = 1 amu)

OR

b. You have a solution of copper(II) sulphate in water. You want to obtain solid copper(II) sulphate from it.

i. Describe why the technique of filtering copper(II) sulphate solution will not work. (1 Mark)

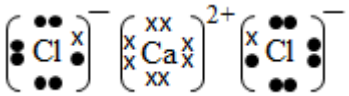
ii. Which method will you use instead? Give a reason to support your answer. (2 Marks)

iii. Describe how you will obtain solid copper(II) sulphate in THREE steps using the method identified in part ii. (3 Marks)

Q.6. (Total 6 Marks)

EITHER

a. Consider the given dot and cross structure of a compound.



(2,8,8) (2,8,8) (2,8,8)

With reference to the given dot and cross structure,

i. identify the type of bond that exists in it. (1 Mark)

ii. describe the role of each atom in the formation of the bond identified in part i. (2 Marks)

iii. write any THREE general characteristics of such type of compounds. (3 Marks)

OR

b.

i. Define the term, 'electrolysis'. (1 Mark)

ii. Describe the electrolysis of concentrated sodium chloride solution (brine). Support your answer by writing chemical equations for reactions occurring at the cathode and the anode of the electrolytic cell. (5 Marks)

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

ANNUAL EXAMINATIONS (THEORY) 2024

Chemistry Paper II

Time: 1 hour 50 minutes Marks: 25

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are SIX questions. Answer ALL questions. Questions 5 & 6 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
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   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue correcting fluid, or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 3 Marks)

An element **X** of period 3 with atomic mass 27 amu carries 3 electrons in its valence shell.

Calculate its number of electrons, protons and neutrons if atom **X** loses all of its valence electrons.

_____

_____

_____

_____

_____

_____

Q.2. (Total 3 Marks)

Complete the given table by choosing the correct element for each property from the following list.

- Fluorine
- Sodium
- Sulphur
- Carbon
- Oxygen
- Helium

S. No.	Property	Element
1	It produces a basic oxide on reaction with oxygen.	
2	It is an unreactive, colourless gas.	
3	It has an oxidation state of negative one.	

Q.3. (Total 3 Marks)

a. Describe the movement of particles in liquid state. (1 Mark)

_____

_____

b. If the liquid is exposed to cold temperatures, what will be the effect on the movement of particles? (1 Mark)

_____

_____

c. If the same number of particles of a gas and liquid are placed in a container at standard temperature and pressure, then why the volume of the gas is found to be greater than that of liquid? (1 Mark)

_____

_____

Q.4. (Total 4 Marks)

Give a reason why metals

a. have high melting points. (1 Mark)

_____

_____

b. are good conductors of electricity. (1 Mark)

_____

_____

c. are malleable and ductile. (1 Mark)

_____

_____

d. are lustrous. (1 Mark)

_____

_____

Q.5. (Total 6 Marks)

EITHER

a. A compound contains 24% carbon, 12% hydrogen and 64% oxygen by mass. The relative molecular mass of this compound is 50.057 g/mol.

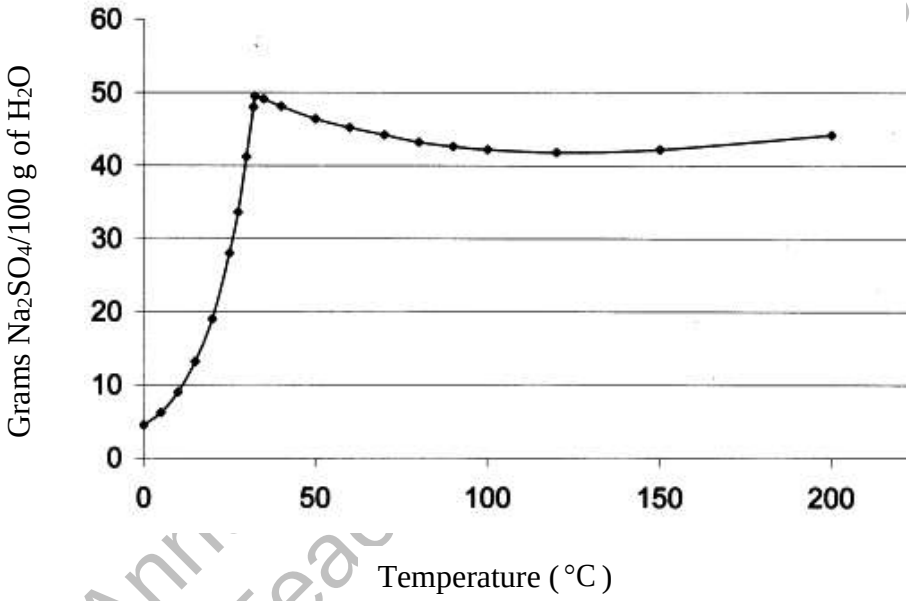
i. Calculate the empirical formula of the given compound. (4 Marks)

ii. Determine its molecular formula. (2 Marks)

(**Note**: Atomic mass of C = 12 amu, H = 1 amu and O = 16 amu)

OR

b. The given graph represents the effect of temperature on the solubility of sodium sulphate.



NOT TO SCALE

With reference to this graph, answer the following questions.

i. Identify the approximate minimum and maximum solubility of Na_2SO_4. (2 Marks)

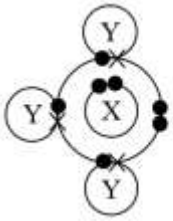
ii. Interpret the trend of solubility of Na_2SO_4 depicted in this graph. (2 Marks)

iii. By mentioning the guiding rule of solubility, describe any ONE factor that affects the solubility of any salt. (2 Marks)

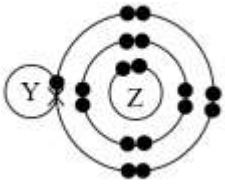
Q.6. (Total 6 Marks)

EITHER

a. Given are the diagrams of two different molecules, **P** and **Q**.



P



Q

The following table provides information about each element of these molecules.

Element	**X**	**Y**	**Z**
Group	5	1	7
Period	2	1	3

Using the given information, answer the following questions.

i. Identify the molecules, **P** and **Q**. (2 Marks)

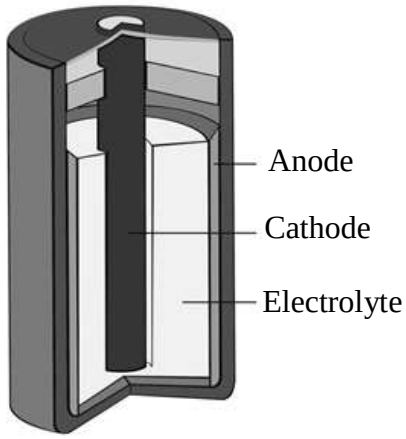
ii. If molecules **P** and **Q** combine chemically, then

I. draw a dot and cross structure to represent the newly formed compound. (1 Mark)

II. name the bond that forms between the two molecules and write any TWO specific characteristics of compounds having this bond. (3 Marks)

OR

b. Given below is the image of a zinc-carbon battery.



i. What is the anode and cathode made up of in the given dry cell battery? (2 Marks)

ii. How does the zinc-carbon battery work? Support your answer using balanced chemical equations for the reactions occurring at the anode and the cathode. (4 Marks)

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

ANNUAL EXAMINATIONS (THEORY) 2025

Chemistry Paper II

Time: 1 hour 50 minutes Marks: 25

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are SIX questions. Answer ALL questions. Questions 5 & 6 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

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   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

Q.1. (Total 3 Marks)

The atom of an element **X** has 8 neutrons, 8 protons and 8 electrons.

a. Identify element **X**. (1 Mark)

_____

_____

b. If the element **X** forms an ion $\mathbf{X}^{-2}$, then how many valence electrons will this ion contain? (1 Mark)

_____

_____

c. An isotope of this element **X** has mass number 18. How many neutrons are there in an atom of this isotope? (1 Mark)

Number of Neutrons: _____

Q.2. (Total 3 Marks)

a. Define the term, 'electron affinity'. (1 Mark)

_____

_____

b. Describe, with a reason, the trend of electron affinity within a group of the periodic table. (2 Marks)

_____

_____

_____

_____

Q.3. (Total 3 Marks)

a. Which has a higher boiling point, oxygen gas or liquid water? (1 Mark)

b. Give reasons with reference to both oxygen gas and liquid water to support your answer to part a. (2 Marks)

Q.4. (Total 4 Marks)

Explain why the

a. first ionisation energy decreases down the group of alkali metals. (2 Marks)

b. second ionisation energy of sodium is higher than that of magnesium. (2 Marks)

Q.5. (Total 6 Marks)

EITHER

a. In each of the given cases, provide a balanced chemical equation and describe any TWO characteristics of a chemical reaction that occurs between:

i. Zinc granules and dilute sulphuric acid (3 Marks)

ii. Calcium oxide (quicklime) and water (3 Marks)

OR

b. You have a solution of copper(II) sulphate in water. You want to obtain pure, solid copper(II) sulphate from it.

i. Describe why the technique of filtering copper(II) sulphate solution will not work. (1 Mark)

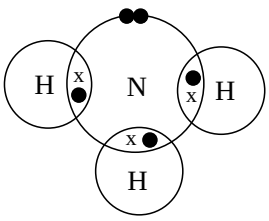
ii. Which method will you use instead? Give a reason to support your answer. (2 Marks)

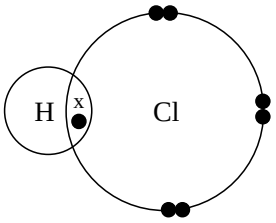
iii. Describe how you will obtain pure, solid copper(II) sulphate in THREE steps using the method identified in part ii. (3 Marks)

Q.6. (Total 6 Marks)

EITHER

a. Given below are the dot and cross structures of ammonia and hydrogen chloride. These two molecules on combining form ammonium chloride.





i. Name the bond that joins nitrogen of ammonia and hydrogen of hydrogen chloride. (1 Mark)

ii. Describe the formation of ammonium chloride. (2 Marks)

iii. Write THREE differences between the bond identified in part i and the one that already exists between nitrogen and hydrogen in ammonia. (3 Marks)

OR

b. Describe any SIX features of a voltaic cell (Galvanic cell). (6 Marks)

Q.1. (Total 3 Marks)

Determine the chemical formula for carbon disulphide by completing the given table.

(**Note**: ${}^{12}_{6}\text{C}$ and ${}^{32}_{16}\text{S}$)

Compound	Valency of Carbon	Valency of Sulphur	Chemical Formula
Carbon disulphide			

Q.2. (Total 3 Marks)

An atom of an element **X** has atomic number 12 and mass number 24. It loses 2 electrons from its outer most shell and acquires a +2 charge.

Draw the atomic structure of the ion of element **X**.

Space for drawing

Q.3. (Total 4 Marks)

Explain the electronegativity trend across the period and down the group in the periodic table.

Across the period: _____

_____

_____

_____

Down the group: _____

_____

_____

_____

Q.4. (Total 3 Marks)

Consider a closed container with liquid having weak intermolecular forces. This liquid experiences both, vapour pressure and boiling point at constant temperature.

Assess the influence of weak intermolecular forces on the vapour pressure and the boiling point of the liquid. Support your answer with scientific reasoning.

Q.5. (Total 6 Marks)

EITHER

a.

i. Balance the given chemical equation by inserting numbers where necessary. (1 Mark)

$$\_\_\_\_ CH_{4(g)} + \_\_\_\_ O_{2(g)} \rightarrow \_\_\_\_ CO_{2(g)} + \_\_\_\_ H_2O_{(l)}$$

ii. Calculate the mass of carbon dioxide and water produced on complete combustion of 0.25 mol of methane.

(**Note**: Molar mass of C = 12 g, O = 16 g and H = 1 g. To solve the numerical, use equation in part i after balancing.) (5 Marks)

OR

b. Given below are four elements.

Non-Metal	Metal
Chlorine $\left({}^{35.5}_{17}\mathrm{Cl}\right)$	Magnesium $\left({}^{24}_{12}\mathrm{Mg}\right)$
Oxygen $\left({}^{16}_{8}\mathrm{O}\right)$	Potassium $\left({}^{39}_{19}\mathrm{K}\right)$

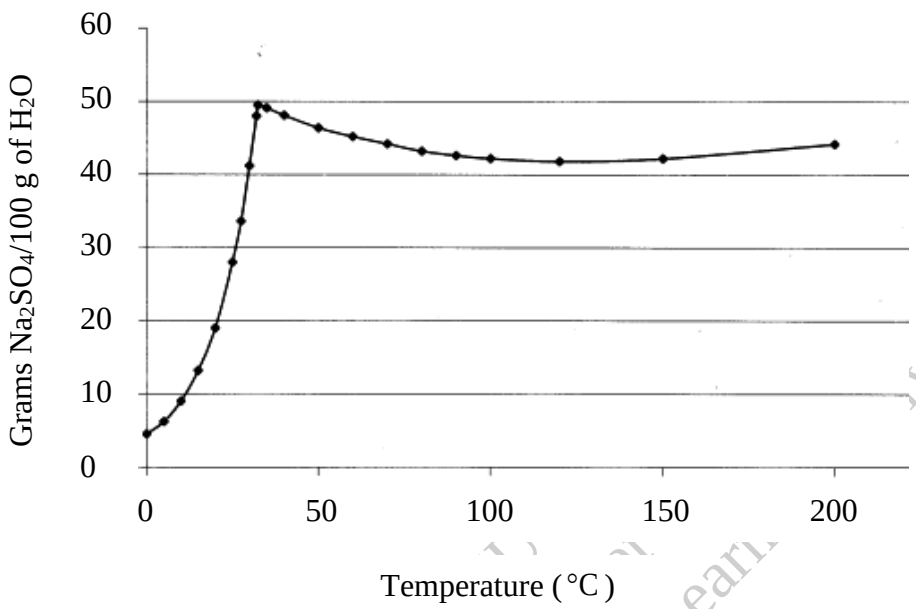
i. Identify TWO elements from the given table which, when form ions, show the same electronic arrangement as a neon $\left({}^{20}_{10}\mathrm{Ne}\right)$ atom. (2 Marks)

ii. Illustrate the formation of an ionic compound using the elements identified in part i with the help of dot and cross structure of the compound. (4 Marks)

Q.6. (Total 6 Marks)

EITHER

a. The given graph represents the effect of temperature on the solubility of sodium sulphate (Na_2SO_4).



NOT TO SCALE

Assess the graph to answer the following questions.

i. Identify the highest and the lowest solubility values of Na_2SO_4. (2 Marks)

ii. Evaluate the solubility trend of Na_2SO_4 with temperature. How does it differ from the general solubility rule and why? (4 Marks)

OR

b. A student sets up an electrolytic cell using molten potassium chloride (KCl). Electrodes are connected to a power source and electrolysis begins.

i. Deduce the direction of movement of cations and anions during electrolysis. Construct balanced chemical equation to represent the reactions occurring at each electrode. (4 Marks)

ii. Evaluate the role of the power source in the electrolytic process and predict what would happen if the power source was removed. (2 Marks)