

## Aga Khan University Examination Board

### Notes from E-Marking Centre on SSC-I Chemistry Examination May 2018

#### Introduction:

This document has been produced for the teachers and candidates of Secondary School Certificate Part I (SSC-I) Chemistry. It contains comments on candidates' responses to the 2018 SSC-I Examination indicating the quality of the responses and highlighting their relative strengths and weaknesses.

#### E-Marking Notes:

This includes overall comments on candidates' performance on every question and *some* specific examples of candidates' responses which support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. However, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised to read and comprehend each question carefully before writing the response to fulfil the demand of the question.

Candidates need to be aware that the marks allocated to the questions are related to the answer space provided on the examination paper as a guide to the length of the required response. A longer response will not in itself lead to higher marks. Candidates need to be familiar with the command words in the SLOs which contain terms commonly used in examination questions. However, candidates should also be aware that not all questions will start with or contain one of the command words. Words such as 'how', 'why' or 'what' may also be used.

#### General Observations:

In comparison to previous years, candidates attempted the paper well. However, there is still room for improvement. Mentioned below are few concepts on which teachers need to focus and give candidates more drill and practice to have a strong grip.

- a. Balancing and construction of chemical equations and ionic equations
- b. Drawing of atomic structures for ions of elements
- c. Oxidation-reduction reactions occurring at the anode and the cathode in different electrolytic cells
- d. Process of crystallisation and effect of temperature on the solubility of different salts in water
- e. Construction and working of a battery to produce electrical energy

**Detailed Comments:****Constructed Response Questions (CRQs)****Question 1:**

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	

*Better responses* showed the correct identification of the branches of chemistry, i.e. nuclear chemistry, biochemistry, analytical chemistry and industrial chemistry for serial numbers 1, 2, 3 and 4 respectively. Candidates demonstrated clear understanding of each of the branch of chemistry with reference to its description provided in the question.

**Example:**

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	Nuclear Chemistry
2.	The study of chemical processes within and relating to living organisms.	Environmental Chemistry	Biochemistry
3.	It deals with the qualitative and quantitative determination of chemical components of substances.	Organic Chemistry	Analytical 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	Industrial chemistry.

*Weaker responses* demonstrated poor conceptual knowledge about the branches of chemistry. A few of these responses displayed correct identification of nuclear chemistry but failed to figure out rest of the three branches. Mostly weaker responses couldn't determine the difference between the study carried out in the field of biochemistry and organic chemistry or physical and industrial chemistry. They identified the description for biochemistry as that of organic chemistry. Similarly, the description for industrial chemistry was recognised as that of physical chemistry. This showed candidates had lack of knowledge about the mentioned fields. A few candidates played around with the incorrect responses given in the table and were unable to think beyond those names.

**Example:**

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	Nuclear chemistry
2.	The study of chemical processes within and relating to living organisms.	Environmental Chemistry	Organic chemistry
3.	It deals with the qualitative and quantitative determination of chemical components of substances.	Organic Chemistry	Environmental 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	Physical chemistry

**Question 2:**

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.

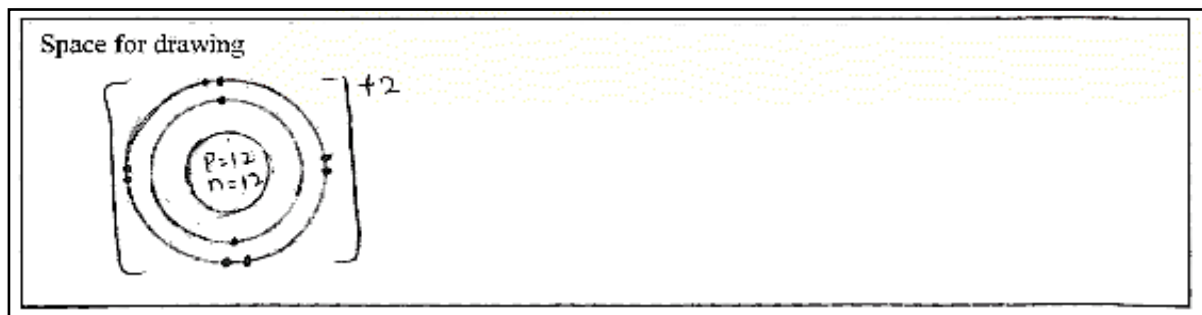
Draw the atomic structure of the ion of element **X**.

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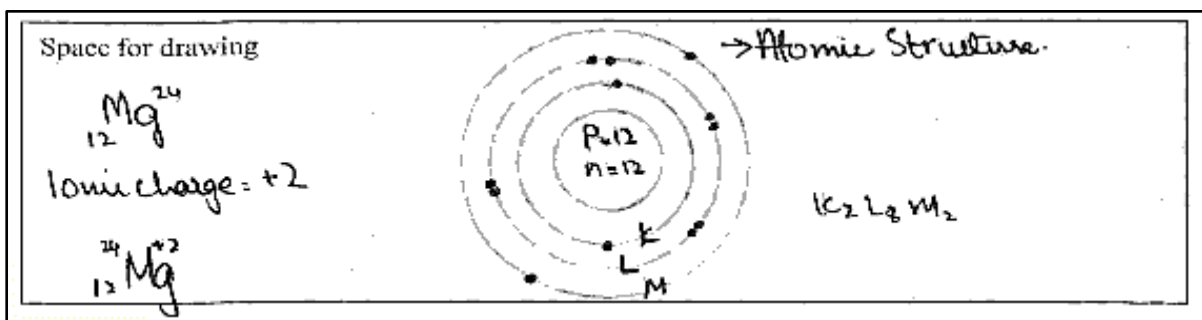
*Better responses* managed to draw the atomic structure of the given ion, i.e. magnesium ion. They illustrated correct number of shells with exact number of electrons and charge of +2 on the ionic structure of magnesium.

**Example:**



*Weaker responses* failed to draw the correct atomic structure for the given magnesium ion. These responses showed lack of understanding of the concept. A few of these responses displayed accurate structure for magnesium atom but couldn't illustrate its ionic form. Some responses represented clarity about the structure of magnesium ion but made careless errors such as charge was not placed, bracket was not drawn to show overall charge on the atom, nucleus was not drawn, mentioned  $2e^-$  and  $8e^-$  on the K and L shell respectively rather than drawing the number of electrons.

**Example:**



**Question 3:**

- a. Define electronegativity.
- b. Describe with reasons,
  - i. the change in electronegativity across the period in the periodic table.
  - ii. the trend in shielding effect when going down a group of the periodic table.

*Better responses* accurately defined the term electronegativity as the ability of an atom to attract the shared pair of electrons towards itself in a molecule. These responses included correct identification of the change in electronegativity across the period and trend in shielding effect down the group of the periodic table followed by logical reasons for their identification.

**Example:**

- a. Define electronegativity. (1 Mark)

The ability of an atom to attract the shared pair of electron towards itself in a molecule is called electronegativity.

- b. Describe with reasons,
  - i. the change in electronegativity across the period in the periodic table. (2 Marks)

Electronegativity increases across the period as the atomic size is small due to more effective nuclear charge. The nuclear charge increases and therefore the shared electron is held with more power and charge.

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

The trend in shielding effect ~~decreases~~ increases when going down a group as there is addition of shells while moving down a group. This addition brings more electrons in between the nucleus and the valence shell, resulting in less effective nuclear charge and more shielding.

Weaker responses showed poor understanding about the periodic trends of elements within a period and group with reference to electronegativity and shielding effect. A few of these responses identified the trends in period and group correctly but couldn't justify their identification. These responses were also not able to produce accurate definition of electronegativity. For example, their mistakes included statements like the change in electronegativity is because the scientist arranged the elements according to increase the atomic number/ the trend in shielding effect is because the periodic table group is down and shielding effect to the last group/ electronegativity decreases across the period because the hold of nucleus is weak/ electronegativity is a group of atom having charge on it.

**Example:**

a. Define electronegativity.	(1 Mark)
the ability to Gain electron is called electronegativity.	
b. Describe with reasons,	
i. the change in electronegativity across the period in the periodic table.	(2 Marks)
When we move left to right across the period, the electronegativity increases.	
ii. the trend in shielding effect when going down a group of the periodic table.	(2 Marks)
When we move downward in a group shielding effect decreases.	

**Question 4a:**

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?
- ii. Explain your answer to part i with reference to the movement of particles.

*Better responses* comprehended the given information correctly and identified hot cup to be the one showing the change in colour of water quickly. These responses displayed accurate reasoning in support of their answer to part i. Their reasons included concepts such as increase in kinetic energy/ weakening of intermolecular forces/ fast movement of particles and increase in the rate of diffusion.

**Example:**

i. In which cup will the water turn brown more quickly?	(1 Mark)
Hot cup.	
ii. Explain your answer to part i with reference to the movement of particles.	(2 Marks)
When we heat any liquid or solution their kinetic energy increases so high and the movement of particles become fast due to which particles diffuse easily and rapidly.	

*Weaker responses* exhibited lack of knowledge about diffusion in liquids and the effect of temperature on the rate of diffusion. Some of these responses identified the hot cup correctly but were unable to justify their identification. They even made errors in the use of scientific terms like in place of particles they wrote electrons and rather than diffusion, mentioned effusion. However, the definition they produced for effusion was actually for diffusion. This showed candidates' lack of understanding of terms in relation to their meanings.

**Example:**

i. In which cup will the water turn brown more quickly?	(1 Mark)
Water turned into brown more quickly in Hot cup.	
ii. Explain your answer to part i with reference to the movement of particles.	(2 Marks)
Hot cup & become brown more quickly because hot particles escape out from the surface more quickly their inter molecular forces become high.	

**Question 4b:**

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.

*Better responses* interpreted the given information correctly and gave distinctive reason for the formation of crystal at 20°C. The points evident in these responses were less solubility at 20°C than at 70°C/ the capacity to hold more solute at 20°C decreases/ spaces created on heating reduces when the solution is cooled and excess solute separates out and settles at the bottom in the form of crystals.

**Example:**

When copper sulphate is cooled down, crystals will form consisting of the undissolved particles. This occurs because temperature increases the solubility of $\text{CuSO}_4$ salt and more solute can be dissolved. But when it is cooled, the solubility again decreases.
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*Weaker responses* failed to comprehend the information provided in the question. These responses presented the concepts of unsaturation and freezing rather than crystallisation and solubility with reference to temperature.

**Example:**

The solution of copper(II) sulphate will remain unsaturated. Because the particles will not get the required temperature which is needed to saturate it.

**Question 5:**

During an experiment,  $\text{MgBr}_2$  and  $\text{NaCl}$  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.  $\text{MgBr}_2$   
At the anode:  
At the cathode:
- b.  $\text{NaCl}$   
At the anode:  
At the cathode:

*Better responses* depicted in-depth understanding of oxidation-reduction reactions that occur during electrolysis of different salts in an electrolytic cell. Candidates used balanced chemical equation to present oxidation of bromide and chloride ions at the anode whereas reduction of magnesium and sodium ions at the cathode.

**Example:**

a.  $\text{MgBr}_2$  (2 Marks)  
At the anode:  
 $2 \text{Br}^- \longrightarrow 2 \text{e}^- + \text{Br}_2$

At the cathode:  
 $\text{Mg}^{+2} + 2 \text{e}^- \longrightarrow \text{Mg}^0$

b.  $\text{NaCl}$  (2 Marks)  
At the anode:  
 $2 \text{Cl}^- \longrightarrow \text{Cl}_2 + 2 \text{e}^-$

At the cathode:  
 $(\text{Na}^+ + 1 \text{e}^- \longrightarrow \text{Na}) 2$   
 $2 \text{Na}^+ + 2 \text{e}^- \longrightarrow 2 \text{Na}$

Weaker responses exhibited poor conceptual knowledge and used a variety of irrelevant chemical equations to show the reactions at the anode and the cathode. Majority of these responses showed oxidation of magnesium and sodium ions at the anode whereas reduced bromide and chloride ions at the cathode. A few placed the elements correctly at their respective electrodes but balanced the chemical equations incorrectly, showing misconceptions of oxidation states of elements. Some even tried to explain the process rather than showing chemical equations.

**Example:**

a.	MgBr <sub>2</sub>	(2 Marks)
	At the anode:	
	$Mg \longrightarrow Mg^{+2} + 2e^-$ (oxidation)	
	At the cathode:	
	$Br + 2e^- \longrightarrow Br^{-2}$ (Reduction)	
b.	NaCl	(2 Marks)
	At the anode:	
	$Na \longrightarrow Na^{+1} + 1e^-$ (oxidation)	
	At the cathode:	
	$Cl + 1e^- \longrightarrow Cl^{-1}$ (Reduction)	

**Question 6:**

Give reasons why:

- Mercury is used in thermometers.
- Silver is used in making jewellery.
- Copper is used to make water pipes.
- Reaction mixture of sodium and water turns red litmus paper to blue.

*Better responses* demonstrated logical reasoning skills of candidates. Candidates interpreted the information well which enabled them to express the correct reason based on the properties of each of the mentioned metals.

**Example:**

Give reasons why:

a. Mercury is used in thermometers. (1 Mark)  
It is a metal which is liquid at room temperature  
and is a good conductor of heat, has uniform thermal expansion.

b. Silver is used in making jewellery. (1 Mark)  
Because it is a shiny white lustrous metal  
which can be polished and is malleable and ductile.

c. Copper is used to make water pipes. (1 Mark)  
Because it can hold the water pressure, doesn't  
break easily, malleable, ductile. has strong metallic bonding.

d. Reaction mixture of sodium and water turns red litmus paper to blue. (1 Mark)  
Red to blue change indicates alkaline solution. Because  
when Na reacts with water <sup>(alkali)</sup> NaOH is formed:  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$

*Weaker responses* were able to justify the use of any one metal only. Mostly these responses got the answer to silver correct. Majority of these responses couldn't specify about the high coefficient of expansion of mercury which makes it workable in thermometers. These responses included statements like the exchange of electrons turn the red litmus paper to blue/ silver is beautiful and attractive; therefore, used in jewellery making/ copper is hard/ copper is strong/ copper is good conductor of heat and electricity/ silver cannot be broken down/ mercury is denser than other liquids/ mercury doesn't wet the glass of thermometer.

**Example:**

Give reasons why:

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

Because it is a good conductor of temperature that's why used in thermometers.

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

BC it is shiny and it doesnot get rusting if it is pure silver.

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

BC it is a bad conductor of electricity so any one cannot get shock because of copper pipes.

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

BC sodium cannot mix with water by any means it will explode and can turn red litmus paper to blue.

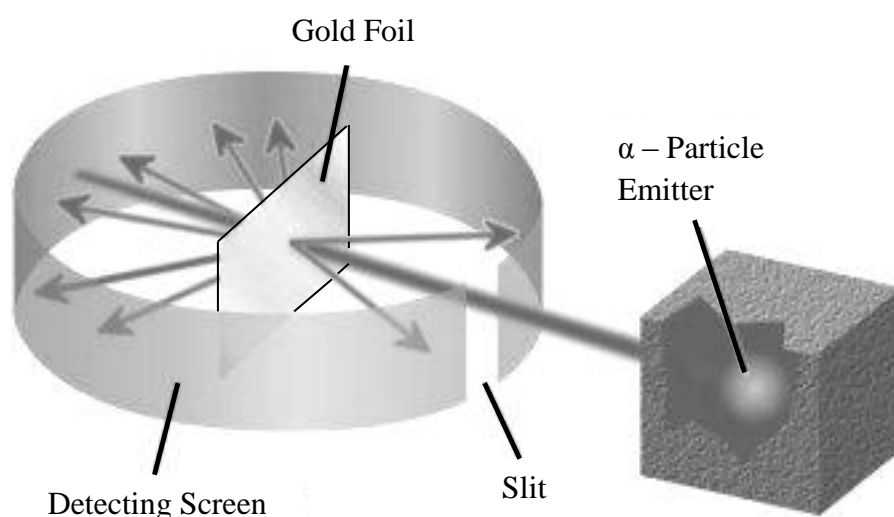
## Extended Response Questions (ERQs)

The following questions (7 and 8) offered a choice between part **a** and **b**.

Majority of the candidates attempted part 'a' of both question 7 and 8. This shows their interest and in-depth understanding of both concepts, i.e. 'atomic structure' and 'states of matter'. However, a fewer responses in part 'b' reflect that mostly candidates lack confidence and command over the knowledge embedded in the concepts of 'structure of molecules' and 'electrochemistry'.

### Question 7a:

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.
- 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.
- iii. Mention the TWO fundamental defects in the planetary model of the atom.

*Better responses* identified Rutherford as the scientist who performed gold metal foil experiment. Furthermore, these responses specified the main points that Rutherford concluded based on the experiment followed by the two defects his proposed model had. The main postulates specified in these responses were like most of the volume occupied by the atom is empty or hollow/ a positively charged body existed inside an atom called nucleus/ the size of the nucleus is very small as compared to the size of the atom/ the nucleus is very dense and hard/ an atom as a whole is neutral/ the number of electrons in an atom is equal to the number of protons inside the nucleus.

**Example:**

Q:

i. Rutherford performed the gold foil experiment in 1911

ii: 1: Electron revolve around the nucleus.

2: Most of the particle passed through the foil undeflected this shows that most of the volume occupied by an atom is empty.

3: The deflection of few particles showed that there is a center of positive charges known as nucleus.

4: The complete rebound of few particle showed that the nucleus is hard and dense.

5: Except electron all other fundamental particles that lie within the nucleus are known as nucleons.

iii: Defects:

1: According to the classical theory of radiation electron being a charged particle should emit energy continuously and ultimately fall into the nucleus.

2: If the electron emit energy continuously it should form a continuous spectrum but in fact line spectrum was observed.

Weaker responses identified the name of the scientist and mentioned one to two common conclusions. However, these responses couldn't figure out the defects that were present in Rutherford's atomic model. A few of these responses identified the scientist as Bohr and J.J. Thompson and wrote irrelevant postulates in connections to them.

**Example:**

- i) The scientist who carried out gold foil experiment was Rutherford.
- ii) The five main points were:
  - 1) Most of the  $\alpha$ -particles crossed the gold foil but some were deflected. Some at large angle & some at smaller angle.
  - 2) The gold foil was used to stop the rays but it didn't stop.
  - 3) The  $\alpha$  experiment was further tested & concluded by Bohr.
  - 4) Rutherford stated atom is small particle which's nucleus weighs as a proton.
  - 5) Electrons were negatively charged.
- iii) Defects in Rutherford's model were:
  - 1) Electrons ~~were~~ <sup>should</sup> emit continuous energy which would form a spectrum.
  - 2) If electrons emitted continuous energy why a spectrum was not formed.

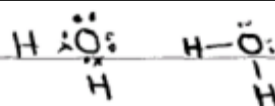
**Question 7b:**

- i. Name and describe the types of bonds and their formation in the following species.
  - I. A water molecule ( $\text{H}_2\text{O}$ )
  - II. A hydronium ion ( $\text{H}_3\text{O}^+$ )
- ii. Mention ONE similarity between the bonds identified in part i.

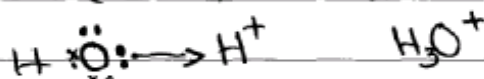
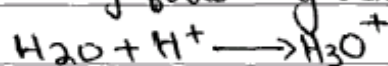
*Better responses* identified the type of bonding present in the molecule of  $\text{H}_2\text{O}$  and  $\text{H}_3\text{O}^+$ . These responses described the formation of bonds in each species in detail and supported their description using diagrams. Few candidates were able to state the basic similarity between the covalent and coordinate covalent bonds.

Example:

b- Water molecule ( $H_2O$ )



The bond formed between  $H_2O$  is covalent bond. Covalent bond is a type of bond which is formed by mutual sharing of electrons. Here each bonded atom contributes equal number of electron and hence covalent bond is formed and that is simple covalent bond. (one-one electron is contributed by each bonded atom).  $2H$  share one-one electrons with  $O$  and complete their outermost shell by following octet rule. (2) Hydronium ion ( $H_3O^+$ )



Here co-ordinate  $\curvearrowright$  bond is formed. It is a type of bond in which donor donates a pair of  $e^-$  and acceptor accepts that  $e^-$  pair by sharing its empty shell. So here in  $H_3O^+$ .  $H_2O$  donates a pair of electron and  $H^+$  accepts that electron pair by sharing its empty shell.  $H_2O$  (donor) and  $H^+$  (acceptor).  $H_2O$  is having two lone pairs it donates its one lone pair when  $H^+$  (proton) come closer to it and form a co-ordinate or dative covalent bond. The similarity between covalent and co-ordinate covalent bond is that both are formed by sharing of electron. Both are slow because bond forms and break in both.

Weaker responses gave the definitions of all types of chemical bonds. In that too, many of the definitions were incorrect. Candidates were unable to identify the type of bonding in water molecule and hydronium ion and even they could not draw their structures. A few responses drew the correct dot and cross structure of water molecule but identified the bond as ionic bonding. The description of coordinate covalent bonding in hydronium ion if given correct then the structure of  $\text{H}_3\text{O}^+$  was wrongly shown with three single covalent bonds. No arrow was shown to represent dative covalent bond. Candidates couldn't figure out the similarity between covalent and coordinate covalent bonds.

Example:

(b)

There are many types of bonds.

- (i) Ionization bond
- (ii) Covalent bond
- (iii) Chemical bond

ionization bond :- In ionisation bond there is different kind of ions it show different kind of ions and it shows the work of every ion.

Chemical bond :- In chemical bond there will be different kind of chemicals it shows type of chemicals and working of chemicals it shows kind of chemicals it shows dangerous chemicals etc.

Covalent bond :- In covalent bond there will be different kind of materials are there it shows different kind of test tubes, different kind of beakers and it show different kind of chemical reaction.

**Question 8a:**

- i. Describe the density of solids and gases based on the strength of intermolecular forces present among their particles.
- ii. Differentiate between amorphous and crystalline solids on the basis of the following properties.
  - Geometrical shape
  - Melting points
  - Symmetry

*Better responses* described the density of solids and gases based on the difference of intermolecular forces present between their particles. These responses also included the appropriate distinguishing points about amorphous and crystalline solids with reference to the attributes/ parameters given in the question.

**Example:**

i) The Density of gas is very less as compared to the density of solids and liquids because the intermolecular forces present in gases are very weak this is because there is a lot of space between the molecules of the gas. The molecules of the gas are far apart from each other and they move in random motion and they can also be easily compressed. While solids have the most density as compared to liquids and gases. This is because the intermolecular forces between the molecules of solid are very strong as compared to gases because the molecules are very close to each other in solids and they cannot move in random motion instead they can just vibrate on their respective positions. Solids cannot be compressed.

ii) Differences between amorphous and crystalline solids are as follows:

	Amorphous solids	Crystalline solids
1) Geometrical shape	1) Amorphous solids are shapeless. They have irregular shape	1) Crystalline solids have a three-dimensional shape.
2) Melting points.	2) Amorphous solids don't have sharp and fixed melting points.	2) Crystalline solids do have sharp and fixed melting points
3) Symmetry	3) Amorphous solids are non symmetric	3) Crystalline solids are symmetric.

Weaker responses demonstrated lack of knowledge regarding the properties of gases and solids. These responses mostly depicted correct understanding of the geometrical shape of amorphous and crystalline solids but produced wrong description about melting point and symmetry in both. Some of these responses also distinguished between densities of solids and liquids rather than solids and gases. A few identified high density in solids and low density in gases but couldn't support their answer with reference to intermolecular forces present between their particles.

Example:

ai)

Solids are the basic state of matter, they have strong intermolecular forces, its particles are tightly packed together and can only vibrate whereas gases have very weak intermolecular forces and are able to move freely because its particles are placed loosely thus gases are denser than solids because of their weak intermolecular forces and high inner pressure.

ii) Amorphous

Crystalline

- Hexagonal shape

Tetrahedral shape

- high melting point but less than crystalline.

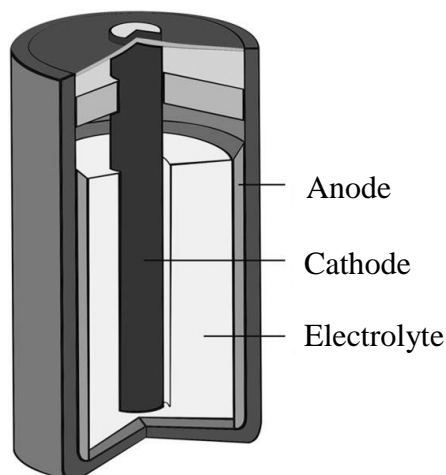
high melting point than amorphous

- form ~~Anisotropic~~ Anisotropic

form Allotropic

**Question 8b:**

Given below is zinc-carbon battery.



- i. What is the anode, cathode and electrolyte made up of in the given dry cell battery?
- 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.

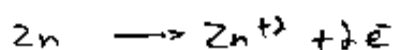
*Better responses* demonstrated correct identification of anode, cathode and the electrolyte. These responses showed coherence in the process that occurs in the zinc-carbon battery. Candidates explained stepwise loss and gain of electrons at the anode and the cathode respectively which enables the battery to work. These responses were well supported by balanced chemical equations representing reactions at the anode and the cathode.

**Example:**

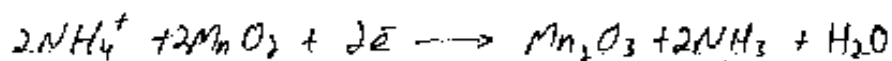
(b) i) The zinc-carbon battery has cathode made up of graphite, anode made up of zinc and electrolyte is powder of  $\text{NH}_4\text{Cl}$  and  $\text{MnO}_2$ .

ii) When the opposite terminals of the battery are connected through a wire than zinc having high oxidation potential loses its

electrons i.e. oxidation occurs:



These two electrons are carried by the wire to cathode (graphite) when the electrolytes gain the electrons i.e. reduction occurs:



So this process continues till <sup>almost</sup> all the zinc atoms have oxidized and after that the battery is unuseful, that's why it is called a dry cell (because it is not rechargeable).

When the electrons move through the wire they can be used for different purposes e.g. in lighting etc.

So the zinc-carbon battery is a galvanic cell which produce electrical energy from chemical energy through the above redox reactions.

Weaker responses exhibited poor knowledge regarding the working of a dry cell (zinc-carbon battery). Candidates just stated about oxidation at anode and reduction at cathode without relating it to the elements involved in the process. They even struggled with the identification of the anode, the cathode and the electrolyte. These responses identified anode and cathode as positive or negative terminals with zinc sulphate electrolyte. This was followed by wrong chemical equations representing illogical reactions at the anode and cathode.

Example:

i) anode (-) negative cathode (+) positive.  
electrolyte are  $ZnCl_2$

ii) The zinc-carbon battery work the electron and flow and attracted the the negative electrons are attracted the positive electron charged and positive electron are the attracted the negative electron.

• chemical equation:-

Anode:-



Cathode:-

