CHEMISTRY

Standard

X

Question Pool

Government of Kerala
Department of Education

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Preface

Learning and evaluation must go hand in hand to understand and enhance progress in learning. It will help to recognize how much progress has been made in conceptualisation, to what extent one has been able to acquire various skills and also to identify the fields one has special aptitude for. Continuous evaluation carried out along with learning activities play a very important role in this. The term evaluation helps in testing and ascertaining the learning outcomes at the end of each stage. This book offers guidance in this direction.

Lessons in each unit of class 10 have learning activities based on knowledge construction incorporated in them in the form of questions. Evaluation indicators and scores are also provided there in, to assess the skills acquired at each stage by the learner. In addition to all these, it is hoped that teachers would endeavour to present more class room activities to instill self confidence in the learners. Let this book show the path for effective learning.

Dr. J. Prasad
Director, SCERT Kerala

Content

Part A

Question Pool

1. **Periodic table and Electronic configuration**
2. **Mole concept**
3. **Rate of chemical reaction and chemical equilibrium**
4. **Reactivity series and electrochemistry**
5. **Production of Metals**
6. **Nomenclature of organic compounds**
7. **Chemical reactions of organic compounds**
8. **Chemistry for Human progress**

Part B

Evaluation indicators

Part C

Sample Question Papers

1

Periodic table and Electronic configuration

Learning outcome

- Identifies the nature of elements and their position in the periodic table based on the sub shell based electronic configuration.

1. The electronic configuration of the elements A,B,C,D are given below.

A - $1s^2\,2s^2\,2p^6\,3s^2\,3p^4$

B - $1s^2\,2s^2\,2p^6\,3s^2$

C - $1s^2\,2s^2\,2p^6\,3s^2\,3p^5$

D - $1s^2\,2s^2\,2p^6\,3s^1$

a) Which of these elements show $^{+}2$ oxidation state? (1)

b) Which metal belongs to 17^{th} group? (1)

c) Which is the period number of the element A? What is the basis of your findings? (1)

d) Which of these elements can form basic oxides? (1)

(Score 4, Time 7 minute)

Learning outcome

Identifies the characteristics of *d* block elements.

2. Two compounds of iron are given below.

$FeSO_4$ $Fe_2(SO_4)_3$

(The oxidation state of sulphate radical is $^{-}2$)

a) Which of these compounds show $^{+}2$ oxidation state for Fe? (1)

b) Which compound has Fe^{3+} ion? (1)

c) Write the subshell electronic configuration of Fe^{3+} ion (1)

d) Why do the transition elements show variable oxidation states? (1)

(Score 4, Time 6 minute)

Learning outcome

Writes the subshell electronic configuration of the elements.

3. Identify the incorrect electronic configurations and correct them.

i) $1s^2\,2s^2\,2p^3$

ii) $1s^2\,2s^2\,2p^6\,3s^1$

iii) $1s^2\,2s^2\,2p^6\,2d^7$

iv) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^4$

(Score 2, Time 5 minute)

Learning outcome

Identifies the nature of elements and their position in the periodic table based on the sub shell electronic configuration.

4. Complete the table.

Outermost electronic configuration	Group Number	Oxidation state
$3s^2\,3p^4$	16	.....(a).....
$3s^1$	.....(b).....	+1
$2s^2\ 2p^5$	.....(c).....	.....(d).....
$3d^{10}\ 4s^2$	.....(e).....	.....(f).....

(Score 3, Time 5 minute)

Learning outcome

Identifies the oxidation states of elements in their compounds.

5. a) Two compounds XY_2, XZ_4 are given. The oxidation state of Z is -1. What will be the oxidation state of Y? (2)

b) Write the molecular formula of the compound formed by Y when it combines with aluminium (Al) having oxidation state +3. (1)

(Score 3, Time 5 minute)

Learning outcome

Identifies the characteristics of f-block elements.

6. Pick out the statements which suits to f - block elements.

a) All of them are naturally occurring elements.

b) Uranium and thorium are 'f' block elements.

c) Last electron is filled in the shell preceding the outermost shell.

d) Last electrons are filled up in the antepenultimate shell.

e) Includes some radioactive elements.

f) Some of them are used as catalysts in petroleum industry.

(Score 2, Time 5 minute)

Learning outcome

Writes the subshell electronic configuration of elements and can find out their valencies.

7. The atomic number of four elements are given below.
(The symbols are not real)

A - 8

B - 10

C - 12

D - 18

a) Write the sub-shell electronic configuration of the elements. (2)

b) Which of them are inert gases? (1)

c) Write the chemical formula of the compound formed by two elements other than inert gases. (1)

(Score 4, Time 8 minute)

Learning outcome

Identifies the characteristics of elements by writing their subshell electronic configuration.

8. The subshell electronic configuration of two elements ends as follows.
(Symbols are not real)
P - $3s^2$ Q - $3p^4$

a) Write the complete subshell electronic configuration. (1)

b) Find out the oxidation state of each element. (1)

c) The chemical formula of the compound formed by these elements is PQ. Is this statement correct? Justify your answer. (2)

(Score 4, Time 8 minute)

Learning outcome

Identifies the characteristics of elements on the basis of their subshell electronic configuration.

9. Match the following.

Block	Outermost electronic configuration	Characteristics
s	$3p^5$	Most of the compounds are coloured.
p	$3d^4\ 4s^2$	Includes Lanthanoids (6^{th} period)
d	$4f^1\ 5d^1\ 6s^2$	Highest atomic radius in the respective period.
f	$3s^1$	High electronegativity

(Score 4, Time 6 minute)

Learning outcome

Identifies the block, period, and group of elements by writing their subshell electronic configuration.

10. The atomic number of two elements are given below.

Si - 14 Ni - 28

a) Write the subshell electronic configuration of these elements. (2)

b) Find out the group and period of each element. (2)

(Score 4, Time 7 minute)

Learning outcome

Identifies the characteristics of elements and their position in the periodic table on the basis of their subshell electronic configuration.

11. The element 'X' has 4 shells, and its 3*d* subshell has 6 electrons. (Symbol is not real)

a) Write the complete electronic configuration of the element. (1)

b) What is its group number? Which is the block? (1)

c) Write any two characteristics of the block to which element X belongs to. (1)

d) From which subshell the electrons are lost when the element X shows +2 oxidation state. (1)

(Score 4, Time 6 minute)

Learning outcome

Identifies the characteristics of elements and their position in the periodic table on the basis of their subshell electronic configuration.

12. The outermost electronic configuration of the element A is $2s^2\ 2p^2$. (Symbol is not real)

a) Find out the group number and block of the element. (1)

b) Write the chemical formula of the compound formed by A when it combines with chlorine. (2)

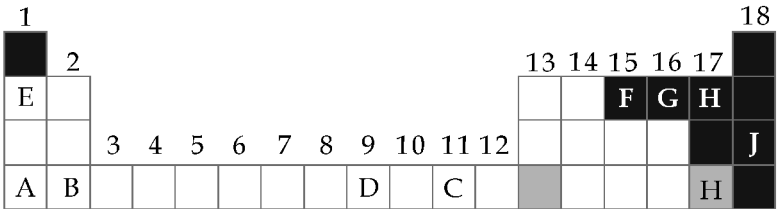
c) Write the complete electronic configuration of the element just below 'A' in the periodic table. (1)

(Score 4, Time 6 minute)

Learning outcome

Identifies the relation between the position of an element in the periodic table and its characteristics.

13. The figure of an incomplete periodic table is given below.



a) Which one of these elements show -2 oxidation state? (½)

b) Which of these elements have 3 electrons in their outermost *p* subshell? (1)

c) Which element has the highest atomic radius? Which one has the least? (1)

d) Which of these elements show variable oxidation state? (1)

e) Which of these element has the highest ionization energy? (½)

(Score 4, Time 6 minute)

Learning outcome

Identifies the characteristics of elements on the basis of their subshell electronic configuration.

14. Examine the given electronic configurations.

A - $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$

B - $1s^2 2s^2 2p^6 3s^1$

C - $1s^2 2s^2 2p^6 3s^2 3p^6$

D - $1s^2 2s^2 2p^6 3s^2$

E - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

a) Which of these elements belongs to 4th period? (1)

b) Which elements belong to the same group? (1)

c) Which element doesn't participate in chemical reactions generally? (1)

d) Which element has highest metallic character? (1)

(Score 4, Time 5 minute)

Learning outcome

Identifies the characteristics of d-block elements.

15. The atomic number of the elements X and Y are 20, 26 respectively. When these elements combines with chlorine, three compounds XCl_2, YCl_2, YCl_3 are formed.

a) What is the specialty of the oxidation number of Y, compared to that of X? (1)

b) Explain the reason for this, on the basis of the subshell based electronic configuration. (2)

(Score 3, Time 6 minute)

2

Mole Concept

Learning outcome

Identifies the number of particles present in one GAM substance and interprets Avogadro number.

1. One GAM substance contains Avogadro number of particles in it.

a) How many particles are there in Avogadro number? (1)

b) Write the number of atoms present in each of the following.

i) 32g Sulphur ii) 32g Oxygen

iii) 32g Carbon

(Atomic mass S = 32, O = 16, C = 12) (3)

(Score 4, Time 6 minute)

Learning outcome

Identifies the number of particles present in one GAM substance and interprets Avogadro number.

2. a) Group the following into pairs having same number of atoms.(2)

A. 2g Hydrogen B. 16g Oxygen

C. 14g Nitrogen D. 8g Helium

(Atomic mass H = 1, O = 16, N = 14, He = 4)

b) How many atoms are present in each pair? (2)

(Score 4, Time 6 minute)

Learning outcome

Explains that there exist a definite proportion between the number of molecules of reactants and products in reactions.

3. $N_2 + 3H_2 \rightarrow 2NH_3$

a) What is the ratio between the reactant molecules in the above reaction?

b) Complete the following table.

Nitrogen molecules	Hydrogen molecules	Molecules formed	Remaining after the reaction
1 N_2	3 H_2	.....(a).....	Remains nothing
2 N_2	7 H_2	2 NH_3	.....(b).....
4 N_2	.....(c).....	.....(d).....	Remains nothing

(Score 3, Time 6 minute)

Learning outcome

Explains that there exist a definite proportion between the number of molecules of reactants and products in reactions.

4. $2H_2 + O_2 \rightarrow 2H_2O$

a) What is the ratio between the reactant molecules in the above reaction? (1)

b) How many O_2 molecules are required to react 1000 H_2 molecules completely? (1)

c) How many water molecules are formed when 1000 H_2 molecules are reacted completely? (1)

(Score 3, Time 5 minute)

Learning outcome

Realises the number of particles present in one GAM and one GMM.

5. Complete the following table (All the elements given are diatomic. Atomic mass O=16, N = 14, Cl = 35.5)

GAM	No. of atoms	GMM	No. of molecules
16 g Oxygen	6.022×10^{23} atoms	32 g Oxygen	.....(a)..... molecules
35.5g Chlorine	.....(b)..... atoms	.....(c)..... g Chlorine	6.022×10^{23} molecules
.....(d)..... g Nitrogen	6.022×10^{23} atoms	28 g Nitrogen	6.022×10^{23} molecules

(Score 2, Time 5 minute)

Learning outcome

Realises the number of molecules present in a GMM substance.

6. 4 samples of substances are given.

68g NH_3	28g N_2	49g H_2SO_4	128g O_2

Hint : Molecular mass NH_3 = 17, N_2 = 28, H_2SO4 = 98, O_2 = 32

a) Which of these samples have same number of molecules? (2)

b) Which of these samples has least number of molecules? (1)

(Score 3, Time 8 minute)

Learning outcome

Compares the number of molecules on the basis of mole concept.

7. Pick out the correct statements from the following. Also correct the incorrect statements.

a) The number of molecules present in 1 mol hydrogen and 1 mol oxygen are same. (1)

b) 2 mol chlorine contain $4 \times 6.022 \times 10^{23}$ chlorine molecules. (1)

c) The mass of ½ mol nitrogen gas is 14 g. (1)

d) 0.5 mol water has the mass 9g. There are 6.022×10^{23} H_2O molecules in it. (1)

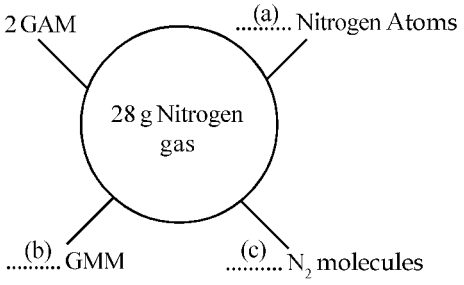
(Atomic mass H = 1, O = 16, Cl = 35.5, N = 14)

(Score 4, Time 6 minute)

Learning outcome

Identifies the number of particles present in one GAM and one GMM.

8. Complete the following. (3)



(Score 3, Time 5 minute)

Learning outcome

Explains the molar volume at STP and solves simple problems.

9. 67.2L of Carbon dioxide gas is filled in a cylinder at STP.

a) Calculate the mass of CO_2 present in it. (Atomic mass - C = 12, O = 16) (2)

b) Calculate the number of CO_2 molecules present in the cylinder. (1)

(Score 3, Time 6 minute)

Learning outcome

Identifies the GMM, Molar volume and number of molecules.

10. Complete the table.

Substance	GMM	Given mass	No. of moles	No. of molecules	Volume of STP
O_2 (MM = 32)	32 g	64 g	(a)	(b)	2 × 22.4L
NH_3 (MM = 17)	(c)	(d)	(e)	$3 \times 6.022 \times 10^{23}$	(f) .....

(Score 3, Time 5 minute)

Learning outcome

Applies mole concept in balanced chemical equations.

11. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

The equation describes the combustion of methane in air.

a) How many moles of oxygen is required for the complete combustion of 16g CH_4? (1)

b) Calculate the amount of CO_2 formed when 100 g of CH_4 is completely burnt? (2)

(Score 3, Time 5 minute)

Learning outcome

Solves simple problems relating to preparation of solutions of different molarities.

12. 45g glucose is taken in a beaker and made into 1L. (MM = 180)

a) Calculate the molarity of the solution. (1)

b) Above solution is made up to 2L by adding more water. What will be the molarity of the resultant solution? (2)

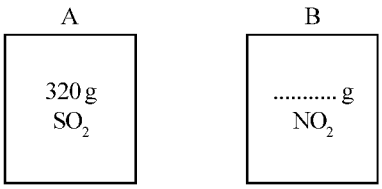
c) How will you prepare 1M solution of glucose with same quantity (45g) of glucose? (1)

(Score 4, Time 7 minute)

Learning outcome

Solves simple problems related to the molar volume at STP and number of molecules.

13. Two gases occupy equal volume at STP are shown below. (Atomic mass S = 32, O = 16, N = 14)



a) Find the mass of the gas in B? (2)

b) Calculate the number of molecules present in B. (1)

(Score 3, Time 6 minute)

Learning outcome

Solves simple problems related to the molar volume and number of molecules.

14. The balanced chemical equation of a reaction (at STP) is given below.

$$2H_{2\,(g)} + O_{2\,(g)} \rightarrow 2H_2O_{\,(g)}$$

a) Calculate the volume of oxygen required to combine completely with 224L of hydrogen at STP. (1)

b) Calculate the mass of water formed as a result of the reaction (a). (2)

(Score 3, Time 6 minute)

Learning outcome

Identifies the relation between molar volume at STP, number of molecules and mass.

15. Complete the table. (3)

Gas	Volume at STP	Mole	Mass
CO_2	.....(a).....	3	.....(b).....
CH_4	5.6 L	.....(c).....	.....(d).....
SO_2	.....(e).....	.....(f).....	32 g

Hint: (MM - CO_2 = 44, CH_4 = 16, SO_2 = 64)

(Score 3, Time 5 minute)

Learning outcome

Identifies the relation between molar volume at STP, number of molecules and mass.

16. Analyse the following equation.

$2NO_{(g)} + O_{2(g)} \rightarrow 2NO_{2(g)}$

(Hint: NO = 30, O_2 = 32, NO_2 = 46)

a) Calculate the number of moles of NO required to combine completely with 112L of Oxygen at STP. (1)

b) Calculate the mass of NO_2 formed when 112L of oxygen react completely? (2)

(Score 3, Time 6 minute)

Learning outcome

Identifies the relation between mol, number of molecules and mass.

17. The chemical equation of the decomposition of calcium carbonate is given below.

$CaCO_3 \rightarrow CaO + CO_2$

(Hint MM: $CaCO_3$ - 100, CaO - 56, CO_2 - 44)

a) Calculate the mass of $CaCO_3$ required to get 224g of CaO? (1)

b) Calculate the number of CO_2 molecules formed when 224g of CaO is obtained? (2)

(Score 3, Time 5 minute)

Learning outcome

Interprets mol on the basis of mass.

18. You are requested to make 20 moles of NaCl into packets of 100 g each. (Hint: Molecular mass of NaCl is 58.5)

a) How many packets of NaCl can be prepared? (2)

b) Is there any NaCl remaining? If so, How much? (1)

(Score 3, Time 5 minute)

3

RATE OF CHEMICAL REACTION AND CHEMICAL EQUILIBRIUM

Learning outcome

- Identifies the way in which the rate of chemical reaction is determined.

1. Dilute HCl is taken in a test tube and 5g zinc metal is added to it. After two minutes the reaction seems to be ceased.

a) Which method can be used to determine the rate of reaction in this case? (1)

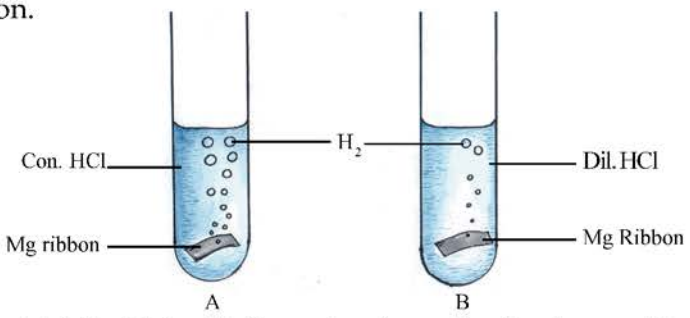
b) Calculate the rate of this reaction using the given data. (2)

(Score 3, Time 5 minute)

Learning outcome

- Identifies the relation between the concentration and the rate of reaction.

2.



a) In which test tube, higher rate of reaction is observed? (1)

b) Which factor affect the rate of reaction? (1)

c) Explain the reason for the increase in the rate of reaction, on the basis of collision theory. (2)

(Score 4, Time 6 minute)

Learning outcome

- Identifies the relation between pressure and the rate of reaction.

3. The balanced chemical equation of two gases A_2 and B_2 at a pressure of 100atm, combines to give the gas AB_3 as given below. (Symbols are not real)

$$A_2 + 3B_2 \rightarrow 2AB_{31}$$

a) If the pressure is increased from 100 atm to 200 atm, what will be the change in the rate of reaction? (1)

b) Explain the reason for the change in the rate of reaction, based on the collision theory. (2)

(Score 3, Time 6 minute)

Learning outcome

- Identifies the relation between surface area and the rate of chemical reaction.

4. In two test tubes, 5 ml dilute HCl is taken. A zinc piece of 2g is added to first test tube and 2g zinc powder in second one.

a) Which test tube shows increased rate of reaction? (1)

b) What is the reason for the increase in the rate? (2)

c) Write an instance in daily life in which this principle is made use of? (1)

(Score 4, Time 5 minute)

Learning outcome

- Identifies the characteristics of an equilibrium.

5. $Fe(NO_3)_3 + 3KCNS \rightarrow \underset{(X)}{.....} + 3KNO_3$

a) Identify X. What is its colour? (1)

b) What will be the observation if the resultant solution is diluted and some KCNS is added to it? (1)

c) What change will occur if KNO_3 is added instead of KCNS? (1)

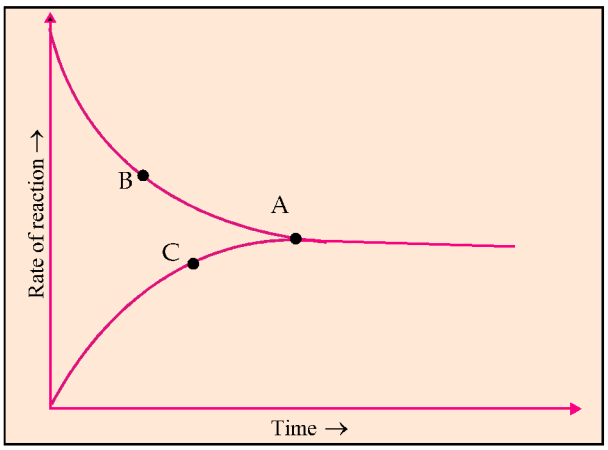
d) Outline the inferences are obtained from the reactions (b) and (c). (1)

(Score 4, Time 5 minute)

Learning outcome

- Analyses the graph related to equilibrium.

6. The graph showing the progress of the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is given.



a) Identify the reactions represented by B and C? (1)

b) What is the significance of the stage A? (1)

c) Is there any change in the concentration, as time passes after attaining the stage A? Explain. (2)

(Score 4, Time 6 minute)

Learning outcome

- Identifies the relation between the temperature and the rate of reaction.

7. Cold water is taken in one test tube an hot water in another one. Mg ribbon with same size is dropped in each of the test tube.

a) In which test tube, hydrogen is formed with greater speed? (1)

b) Which factor influences the rate of reaction? Explain the reason. (3)

(Score 4, Time 7 minute)

Learning outcome

- Explains the chemical equilibrium on the basis of Le Chatelier principle.

8. The chemical equation of the industrial preparation of ammonia is given below.

$N_2 + 3H_2 \rightleftharpoons 2NH_3 +$ Heat

a) Suggest the methods to get more NH_3. (2)

b) Describe the reason for each method. (2)

(Score 4, Time 6 minute)

Learning outcome

- Explains the chemical equilibrium on the basis of Le Chatelier principle.

9. $H_{2\,(g)} + I_{2\,(g)} \rightleftharpoons 2HI_{(g)} +$ Heat

The following circumstances influence the reaction.

a) Increase the concentration of H_2. (1)

b) Increase the pressure (1)

c) Increase the temperature. (1)

(Score 3, Time 6 minute)

Learning outcome

- Explains the chemical equilibrium on the basis of Le Chatelier principle.

10. The formation of SO_3 in the industrial preparation of sulphuric acid is given below.

$2SO_2 + O_2 \rightleftharpoons 2SO_3 + \text{Heat}$

a) Explain the effect of concentration of O_2 to get maximum yield of SO_3? State reason. (2)

b) Identify the law related to it? State. (1)

(Score 3, Time 5 minute)

Learning outcome

- Explains the influence of a catalyst in chemical equilibrium.

11. The chemical equation of a stage in the industrial preparation of sulphuric acid is given below.

$2SO_2 + O_2 \rightleftharpoons 2SO_3 + \text{Heat}$

a) Which is the catalyst used in this reaction? (1)

b) What is the influence of the catalyst in the equilibrium? (1)

(Score 2, Time 5 minute)

Learning outcome

- Explains the influence of a catalyst in the rate of a chemical reaction.

12. $2H_2O_2 \xrightarrow{MnO_2} 2H_2O + O_2$

a) Which substance remains in the test tube without any change after the completion of reaction? (1)

b) What is the role of this substance in the reaction? (1)

(Score 2, Time 7 minute)

Learning outcome

- Identifies the methods for high yield of products by applying Le Chatelier principle.

13. The chemical equation of the industrial preparation of ammonia is given below.

$N_2 + 3H_2 \rightleftharpoons 2NH_3 + \text{Heat}$

a) Temperature is to be decreased to get maximum yield of ammonia, according to the Le Chatelier principle. Why? (2)

b) What is the reason for taking an optimum temperature in this reaction? (2)

(Score 4, Time 5 minute)

Learning outcome

- Identifies the methods for high yield of products in the reactions which attain equilibrium by applying Le Chatelier principle.

14. Analyse the following equations and answer the questions.

i) $NH_4Cl_{(s)} \rightleftharpoons NH_{3\,(g)} + HCl_{(g)}$

ii) $H_{2\,(g)} + I_{2\,(g)} \rightleftharpoons 2HI_{(g)}$

iii) $N_{2\,(g)} + 3H_{2\,(g)} \rightleftharpoons 2NH_{3\,(g)}$

a) Which of these reactions are affected by change in pressure? What are the reasons? (2)

b) How the increase in pressure influence the reaction which you have already identified? (1)

(Score 3, Time 6 minute)

Learning outcome

- Explains the influence of a catalyst in chemical equilibrium.

15. Catalysts are substances which influence the rate of chemical reactions. Explain how the catalysts influence the rate of reversible reaction? (2)

(Score 2, Time 5 minute)

Learning outcome

- Explains the influence of temperature and pressure on a chemical equilibrium on the basis of Le Chatelier principle.

16. Some features of a reversible reaction are given below.

- Product formation increases when the temperature is increased.
- There is no effect, when the pressure is increased.

Explain the reason for above inferences. (2)

(Score 2, Time 4 minute)

Learning outcome

- Explains the factors influencing the chemical equilibrium.

17. $A + B + Heat \rightleftharpoons 2C + D$

This reversible reaction is in equilibrium. What happens to the amount of products under the following conditions?

a) C is removed from the system.

b) B is added in excess.

c) Temperature is increased.

d) A suitable catalyst is added.

(Score 2, Time 4 minute)

4

REACTIVITY SERIES AND ELECTROCHEMISTRY

Learning outcome

- Compares the reaction of various metals with water.

1. 5 ml water is taken in 3 test tubes. Copper, sodium and magnesium of equal mass are dropped in different test tubes. Test tubes having copper and magnesium are heated.

a) Write the observations in the heated test tubes. (1)

b) Write the equation for the reaction in the test tube in which sodium is dropped. (1)

c) Arrange these metals in the decreasing order of their reactivity. (1)

(Score 3, Time 6 minute)

Learning outcome

- Compares the reaction of various metals with water.

2. a) Which metal among copper, aluminium and gold lose its metallic luster at a faster rate? Write the equation of the reaction. (1)

b) Sodium is kept in kerosene. Why? (2)

(Score 3, Time 6 minute)

Learning outcome

- Realises the reaction of metals with dilute hydrochloric acid.

3. An experimental set up is made to compare the reactions of Mg, Zn and Cu with dilute hydrochloric acid.

a) Write the procedure and observation of the reaction. (3)

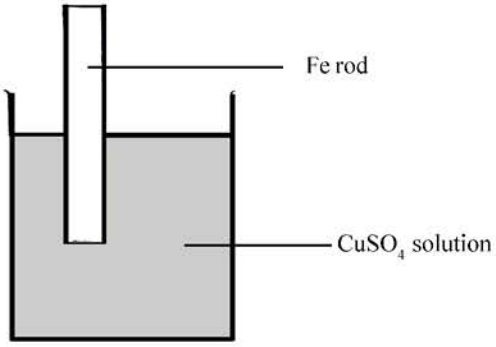
b) Which is the gas evolved when zinc react with dilute hydrochloric acid? (1)

(Score 4, Time 8 minute)

Learning outcome

- Knows about the displacement reaction.

4.



a) What are the changes that can be observed with the iron rod and the colour of copper sulphate solution? (1)

b) Write the equations of the oxidation and reduction reactions. (1)

c) What will be the change if silver rod is used instead of iron rod? What is the reason? (2)

(Score 4, Time 10 minute)

Learning outcome

Understands the reaction of sodium with water.

5. Sodium reacts with water.

a) Identify the gas evolved in the reaction. (1)

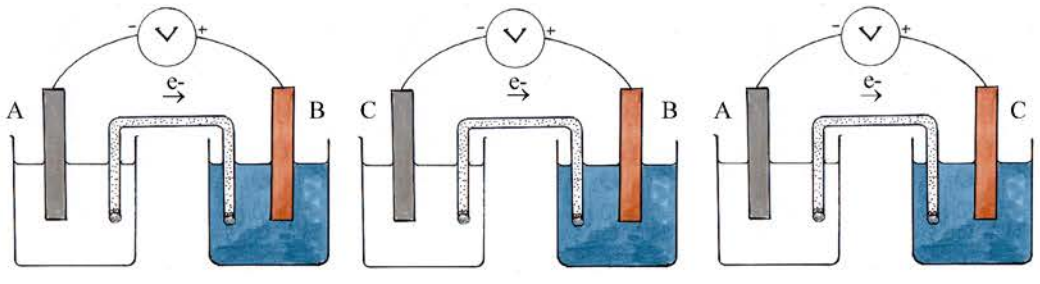
b) If two drops of phenolphthalein is added to the water, what will be colour change of the resultant solution? Explain the reason? (2)

(Score 3, Time 6 minute)

Learning outcome

- Makes a Galvanic cell and writes the equations at the electrodes.

6. Three Galvanic cells are given.



I II III

a) Find out the most reactive metal and the least reactive metal among them. (1)

b) In cell 1, which electrode undergoes to oxidation? Why? (2)

c) Write the equations of the redox reaction occuring in cell 3. (1)
(The valency of 'A' and 'B' are 2)

(Score 4, Time 8 minute)

Learning outcome

- Makes a Galvanic cell.

7. Some metals and salt solutions are given.

($Cu, Zn, Ag, ZnSO_4, AgNO_3, MgCl_2$)

a) Draw the diagram of a Galvanic cell that can be made using these substances. (2)

b) Find out the anode and cathode of this cell and write the chemical equation for the reaction at cathode. (2)

(Score 4, Time 10 minute)

Learning outcome

- Identifies the chemical reactions and features of metals.

8. Give reason for the following.

a) Iron vessels are not used as boilers that are used to boil water. (1)

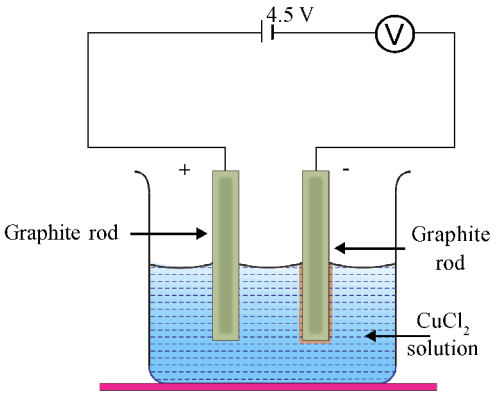
b) Blue vitriol solution is not kept in iron vessels. (1)

(Score 2, Time 6 minute)

Learning outcome

- Identifies the reactions in the electrolytic cells.

9. Examine the given electrolytic cell.



a) Which gas is evolved at the positive electrode? (1)

b) Write the oxidation and reduction reactions of this cell. (1)

c) What is the difference in the energy transformation of a Galvanic cell and an electrolytic cell? (2)

(Score 4, Time 10 minute)

Learning outcome

- Identifies the substances liberated at the anode and cathode in the electrolysis of solutions.

10. The solutions in the given table are electrolyzed.

a) Complete the table.

Electrolyte	Substance liberated/ deposited at anode	Substance liberated/ deposited at cathode
i) Acidified water	Oxygen	.....(i).....
ii) Molten sodium chloride	.....(ii).....	Sodium
iii) Aqueous solution of Sodium chloride	.....(iii).....	.....(iv).....

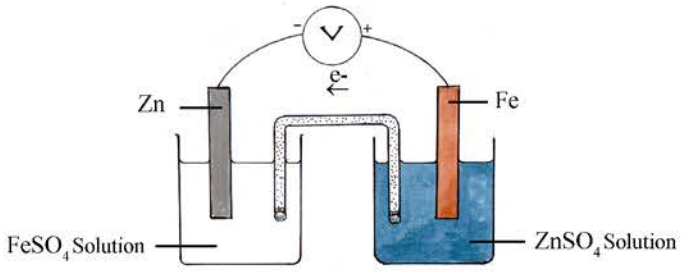
b) List any two areas in which electrolysis is made use of? (2)

(Score 4, Time 8 minute)

Learning outcome

- Draws a Galvanic cell.

11. The position of iron is below that of zinc in reactivity series. The cell formed by them is given. Correct the mistakes redraw.



(Score 2, Time 5 minute)

Learning outcome

- Familiarize with electrolytic cells and explains the chemical reactions in them.

12. Sodium chloride solution is electrolysed using platinum electrodes.

a) Write the chemical equation of the reaction at cathode. (1)

b) What happens when phenolphthalein is added to the solution? State the reason? (2)

(Score 3, Time 6 minute)

Learning outcome

- Writes the chemical reactions on Galvanic cells.

13. The anode and cathode of two Galvanic cells are given.

Galvanic cell	Anode	Cathode
Cell 1	Mg	Zn
Cell 2	Zn	Ag

A. $Mg \rightarrow Mg^{2+} + 2e^-$

B. $Zn^{2+} + 2e^- \rightarrow Zn$

C. $Ag^+ + le^- \rightarrow Ag$

D. $Zn \rightarrow Zn^{2+} + 2e^-$

E. $Ag \rightarrow Ag^+ + le^-$

F. $Mg^{2+} + 2e^- \rightarrow Mg$

a) Find out the reactions at the anode and cathode for each cell from the above. (2)

b) Which metal can act only as cathode? Why? (2)

(Score 4, Time 6 minute)

Learning outcome

Identifies redox reactions.

14. The chemical reactions of various Galvanic cells are given as incomplete in the table. Complete them.

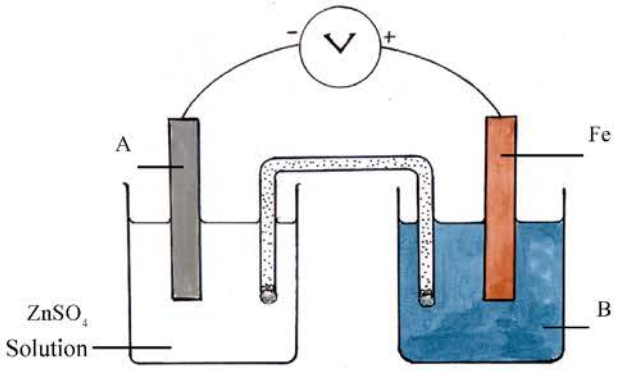
Cell	Chemical Reaction		Redox Reaction
	Anode	Cathode	
Zn - Cu	.....(a).....	$Cu^{2+} + 2e^- \rightarrow Cu$	.....(b).....
Fe - Ag	.....(c).....	.....(d).....	$Fe + 2Ag^+ \rightarrow Fe^{2+} + 2Ag$
Mg - Pb	$Mg \rightarrow Mg^{2+} + 2e^-$	.....(e).....	.....(f).....

(Score 3, Time 5 minute)

Learning outcome

- Makes a Galvanic cell.

15. The picture of a Galvanic cell is given below.



a) Identify A and B. (1)

b) Give the direction of electron flow? (1)

c) Write the chemical equation at the anode and cathode. (2)

(Score 4, Time 6 minute)

Learning outcome

- Become familiar with various electrolytic cells and explains the reactions in them.

16. An incomplete table about the electrolysis of different electrolytes are given below. Complete it.

Electrolyte	Ions/Molecules	Chemical Reaction	
		Anode	Cathode
$CuCl_2$ Solution	.....(a).....	$2Cl^- \rightarrow Cl_2 + 2e^-$	$Cu^{2+} + 2e \rightarrow Cu$
Water acidified with H_2SO_4	$2H_3O^+$, SO_4^{2-}, H_2O	.....(b).....	$2H_3O^+ + 2e^- \rightarrow H_2 + 2H_2O$
Molten NaCl	.....(c).....	$2Cl^- \rightarrow Cl_2 + 2e^-$	.....(d).....
NaCl Solution	Na^+, Cl^-, H_2O	.....(e).....	.....(f).....

(Score 3, Time 6 minute)

Learning outcome

- Explains the displacement reaction.

17. 5 mL $AgNO_3$ is taken in a test tube and a copper rod is dipped in it.

a) Identify the changes occuring with the copper rod and the solution? (1)

b) Complete the equation of the reaction.

$Cu + 2AgNO_3 \rightarrow$ ..... + ... (1)

c) Write the equations of the oxidation and reduction reactions. (2)

(Score 4, Time 8 minute)

5

PRODUCTION OF METALS

Learning outcome

- Identifies the ores.

1. Some metals and ores are given. Match them suitably.

Metal	Ore
Aluminium	Calamine
Zinc	Bauxite
Iron	Cuprite
Copper	Haematite

(Score 2, Time 3 minute)

Learning outcome

- Identifies the various methods of ore concentration.

2. Nature of some ores are given. Pick out the method of concentration from the bracket.

(Magnetic separation, Froth floatation, Levigation, Leaching)

(i) Ores are lighter and impurities are heavier.
(ii) Ore is magnetic. But impurities are non-magnetic.
(iii) Uses a solution which dissolves the ore.
(iv) Ore is heavier and impurities are lighter.

(Score 4, Time 5 minute)

Learning outcome

- Identifies the difference between calcination and roasting.

3. Calcination is used to convert zinc carbonate into zinc oxide. But, cuprous sulphide is converted into cuprous oxide by roasting.

(a) What is the difference between calcination and roasting? (2)
(b) What happens to the ore when it is subjected to calcination? (1)

(Score 3, Time 5 minute)

Learning outcome

- Chooses various methods for the concentration of ores.

4. (a) Some metals and their methods of concentration are given. Match them suitably. (3)

Mercury, Zinc, Tin, Copper, Lead
Liquation, Electrolytic refining, Distillation

(b) Write the reason for selecting the methods for concentration of mercury and tin. (1)

(Score 4, Time 8 minute)

Learning outcome

- Identifies the relation between the reactivity series and metallurgy.

5. The order the reactivity of some metals are given. Answer the following questions by analyzing it.

$$Al > Zn > Cu > Au$$

(a) Which metal is produced by the electrolysis of its molten salt? (1)

(b) Metal occur in free state in nature. (1)

(c) Metal produced by the self oxidation-reduction reaction. (1)

(d) Metal ore which is reduced by carbon. (1)

(Score 4, Time 5 minute)

Learning outcome

- Identifies the role of reducing agent in metallurgy.

6. A reducing agent is required to extract the metal from its ore. Why? Explain with example.

(Score 2, Time 4 minute)

Learning outcome

- Explains the method of production of iron.

7. The equations of the production of iron in the blast furnace are given. Answer the following questions.

$$C + O_2 \rightarrow CO_2$$

$$CO_2 + C \rightarrow 2CO$$

$$CaCO_3 \rightarrow CaO + CO_2$$

$$CaO + SiO_2 \rightarrow CaSiO_3$$

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

(a) Which substance reduces haematite in the metallurgy of iron? How this reducing agent is produced in the furnace? (2)

(b) Which is the main impurity found in haematite? Which substance is used to remove the gangue? (1)

(c) Write the chemical equation of the formation of slag in blast furnace. (1)

(Score 4, Time 4 minute)

Learning outcome

- Realises the difference between pig iron and cast iron.

8. (a) How pig iron is converted into cast iron? (1)

(b) Molten cast iron is poured into moulds to make different shapes. Which speciality of cast iron is based for it? (1)

(Score 2, Time 3 minute)

Learning outcome

- Identifies the features of the alloys of steel.

9. Alloys containing iron are given. Find out a, b, c and d.

Alloys	Components	Uses
i) Alnico	(a)	(b) .....
ii) ..... (c)	Fe, Cr, Ni, C	For making utensils
iii) Nichrome	Fe, Cr, Ni, C	(d) .....

(Score 2, Time 4 minute)

Learning outcome

- Explains the concentration of bauxite.

10. Aluminium is prepared industrially by Hall-Heroult process. Various steps in the concentration of ore are given below. Write them in the correct order.

(i) The precipitate formed is separated, washed and strongly heated to get alumina.

(ii) Crushed bauxite is leached with hot sodium hydroxide solution.

(iii) Impurities are removed from the sodium aluminate solution by filtration.

(iv) Solution is diluted after adding a little aluminium hydroxide, to precipitate aluminium hydroxide.

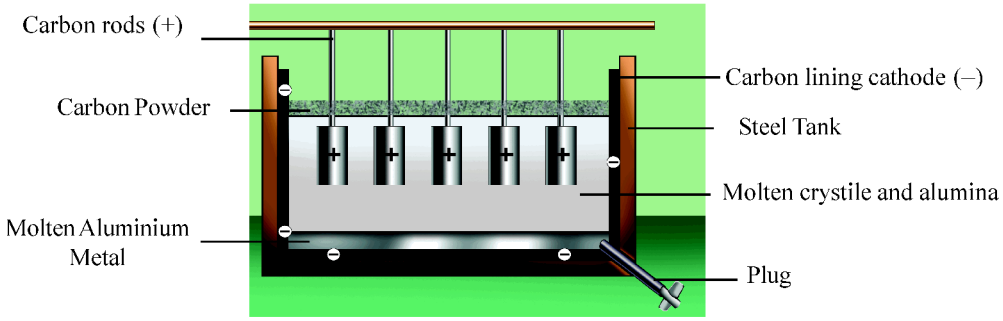
(Score 2, Time 6 minute)

Learning outcome

- Realises the method of extracting aluminium from alumina.

11. (a) Carbon monoxide cannot be used as reducing agent to extract aluminium from alumina. Why? (1)

(b) The electrolytic cell for alumina is given below.



(i) Al_2O_3 dissolved in molten cryolite is used as the electrolyte. What is the purpose of adding cryolite in alumina? (1)

(ii) Anode is replaced from time to time while producing aluminium. Why? (1)

(iii) Write the chemical equation of the reaction at the cathode. (1)

(Score 4, Time 8 minute)

Learning outcome

- Explains the refining process of copper.

12. (a) Illustrate the arrangement of refining copper and label the anode, cathode and electrolyte. (2)

(b) Write the chemical equations at the anode and cathode and sustain it as a redox reaction. (2)

(Score 4, Time 8 minute)

Learning outcome

- Explains the concentration of aluminium ore.

13. Clay, cryolite and bauxite are the minerals of aluminium.

(a) Which among them is the ore of aluminium? What is its chemical formula? (2)

(b) What are the features of an ore? (2)

(Score 4, Time 8 minute)

Learning outcome

- Identifies the role of $CaCO_3$ in the metallurgy of iron.

14. The chemical reaction of calcium carbonate while heating is given.

$$CaCO_3 \xrightarrow{Heat} CaO + CO_2$$

How this reaction is made use in the metallurgy of iron?

(Score 2, Time 4 minute)

Learning outcome

- Realises the method of concentration of an ore.

15. Find the relation and answer the following.

(a) Zinc sulphide : Roasting; Calcium carbonate : .....

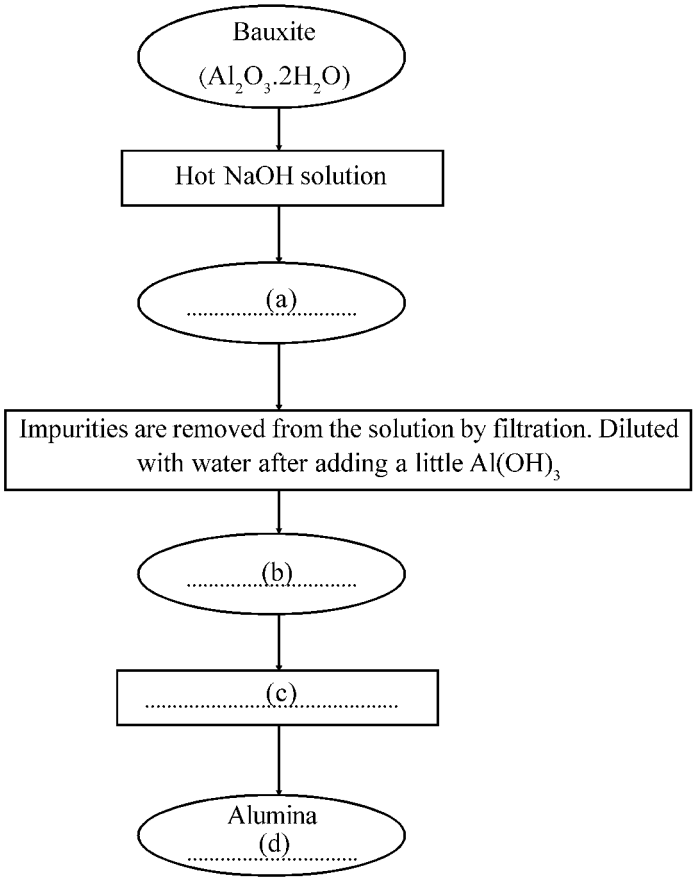
(b) Haematite : Magnetic separation; Bauxite : .....

(Score 2, Time 3 minute)

Learning outcome

- Realises the concentration of bauxite.

16. The flow chart of the process of concentration of aluminium ore is given. Complete the flowchart.



(Score 2, Time 5 minute)

6

NOMENCLATURE OF ORGANIC COMPOUNDS

Learning outcome

- Writes the IUPAC name, molecular formula and structural formula of straight chain hydrocarbons.

1. Complete the table.

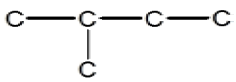
Name of compound	Number of carbon atoms	Chemical formula	Structural formula
Butane	4	C_4H_{10}	$CH_3 - CH_2 - CH_2 - CH_3$
Heptane	7	(a)	(b) .....
(c)	6	C_6H_{14}	(d) .....

(Score 2, Time 5 minute)

Learning outcome

- Writes the structural formula, IUPAC name and the isomers of alkenes containing a methyl radical as branch.

2. The structure of a hydrocarbon having 5 carbon atoms is given below.



a) Complete the structure by adding hydrogen atoms. (1)

b) Write the molecular formula of the compound. (1)

c) Write a possible chain isomer of the compound. (1)

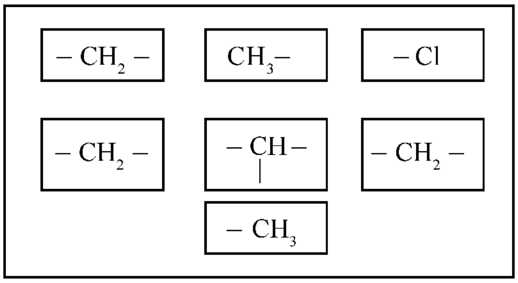
d) Write its IUPAC name. (1)

(Score 4, Time 7 minute)

Learning outcome

- Writes the structural formula, IUPAC name of hydrocarbon and structural formula of its position isomer.

3. The parts of the structure of an organic compound are given below.



a) Write a completed structure of an organic compound by connecting all the groups given above. (1)

b) Write the IUPAC name of the compound. (1)

c) Write the structure of a position isomer of the compound. (1)

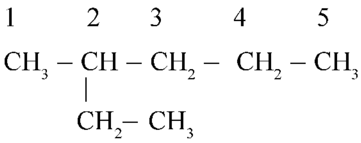
(Score 3, Time 6 minute)

Learning outcome

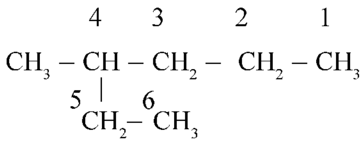
- Writes the IUPAC name of a hydrocarbon containing a branch.

4. A hydrocarbon chain with molecular formula C_7H_{16} is numbered in four different ways.

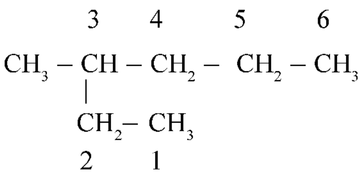
A.



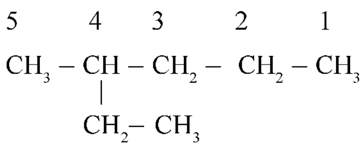
B.



C.



D.



a) Which of the above is numbered correctly? (1)

b) What is the name of the alkyl radical found as the branch? (1)

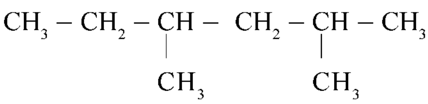
c) Write the IUPAC name of the compound. (1)

(Score 3, Time 5 minute)

Learning outcome

- Writes the IUPAC name of the hydrocarbons with more than one methyl radical as branches.

5. Analyse the following structural formula and answer the questions.



a) How many carbon atoms are there in the longest chain? (1)

b) What are the positions of the branches? (1)

c) Write the IUPAC name of the compound. (1)

(Score 3, Time 5 minute)

Learning outcome

- Writes the IUPAC name of the hydrocarbons with methyl and ethyl radicals as branches.

6. The features of an organic compound are given.

- It's an alkane.
- There are 7 carbon atoms in the longest chain.
- There is a methyl radical on the 3rd carbon and ethyl radical on the 4th carbon.

a) Write the structural formula of the compound. (1)

b) Write the IUPAC name of the compound. (2)

(Score 3, Time 5 minute)

Learning outcome

- Identifies the isomers and write their structural formula and IUPAC name.

7. The functional groups of two compounds with same molecular formula are given. Analyse it and complete the boxes.

(i) C_4H_8O

Functional group	Structural formula	IUPAC name
C=O	(a)	(b) .....
O C H	(c)	Butanal

(3)

(ii) What is the name of this isomerism? (1)

(Score 4, Time 6 minute)

Learning outcome

- Identifies the isomers and write their structural formula and IUPAC name.

8. Analyse the given organic compounds and answer the following questions.

(i) $CH_3 - CH_2 - CH_2 - CH_3$ (ii) $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_2 - CH_3$

(iii) $CH_3 - CO - CH_3$ (iv) $CH_3 - CH_2 - CH_2 - CH_2 - OH$

(v) $CH_3 - CH_2 - CH_2 - CHO$

a) Identify the isomer pairs. Write the type of isomerism observed in them. (2)

b) Write the structure of the isomer of compound (iii). Write the IUPAC name. (2)

(Score 4, Time 7 minute)

Learning outcome

- Identifies the various functional groups and name the compounds containing these groups.

9. Complete the table.

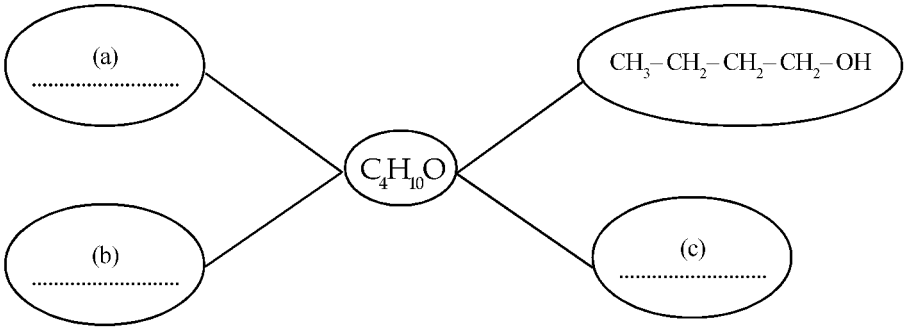
Structural formula of compound	Name of functional group	IUPAC name
$CH_3 - CH_2 - CH_2 - OH$	(a)	Propan-1-ol
$CH_3 - CH_2 - CH_2 - CH - NH_2$	(b)	(c) .....
(d)	Alkoxy group	Ethoxy propane

(Score 4, Time 6 minute)

Learning outcome

- Writes the different structural formula of compounds having same molecular formula.

10. a, b, c are the different isomers of C_4H_{10}.



a) Identify a, b, c. (3)

b) Identify a pair of functional isomers among them. (1)

(Score 4, Time 6 minute)

Learning outcome

- Writes the IUPAC name of hydrocarbon having a branch, the structure of its isomers and the type of isomerism.

11. $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_3$

a) Write the IUPAC name of this compound. (1)

b) Write the molecular formula. (1)

c) Write the structural formula of its isomer. (1)

d) Identify the type of isomerism in the above. (1)

(Score 4, Time 5 minute)

Learning outcome

- Explains the features of functional groups and isomerism.

12. The structural formula of two organic compounds are given below.

(i) $CH_3 - CH_2 - CH_2 - OH$ (ii) $CH_3 - O - CH_2 - CH_3$

a) What is the similarity between these two? What is this phenomenon known as? (1)

b) Is their chemical properties the same? What is the reason? (1)

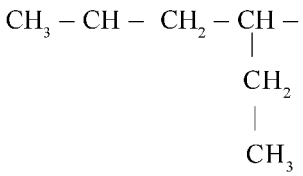
c) Write the functional groups of these two compounds. (1)

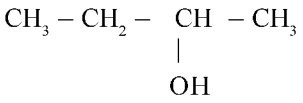
(Score 3, Time 5 minute)

Learning outcome

- Writes the IUPAC names of alkanes, alkenes and compounds having functional groups.

13. Analyse the IUPAC names given to the following organic compounds and correct them, if incorrect.

(i)  2-Ethyl pentane

(ii)  Butan-2-ol

(iii) $CH_3 - CH_2 - CH = CH - CH_3$ Pent-3-ene

(Score 4, Time 4 minute)

Learning outcome

- Knows about the features of alkenes and their IUPAC naming.

14. An organic compound is given below.

$CH_3 - CH_2 - CH_2 - CH = CH - CH_3$

Pick out the suitable statements for the given compound from below.

a) It's a saturated compound.
b) The general formula is C_nH_{2n}.
c) It's an alkene.
d) IUPAC name is hex-4-ene.
e) Has similarity with the molecular formula of cyclohexane.
f) IUPAC name in hex-2-ene.

(Score 2, Time 3 minute)

Learning outcome

- Writes the IUPAC names of alkanes and alkenes.

15. Match the following.

Structural formula	IUPAC name	Molecular formula
$CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{\vert}{CH}} - C \equiv CH$	But-1-ene	C_5H_{10}
$CH_2 = CH - CH_2 - CH_3$	2-Methyl but-1-ene	C_6H_{10}
$CH_3 - C \equiv C - CH_2 - CH_3$	3-Methyl pent-1-yne	C_5H_8
$CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{\vert}{C} = CH_2}$	Pent-2-yne	C_4H_8

(Score 4, Time 8 minute)

Learning outcome

- Writes the IUPAC names of alkynes and the different isomers from the structural formula.

16. $CH_3 - CH_2 - C \equiv C - CH_2 - CH_3$

a) Write the IUPAC name of this organic compound. (1)

b) Write the structures of any three isomers of this compound. (3)

(Score 4, Time 6 minute)

Learning outcome

- Writes the structure of alkenes and identify its features.

17. Some details about the structure of an organic compound are given below.

i) There are 5 carbon atoms in the main chain.

ii) There is a double bond between 1st and 2nd carbon atoms.

iii) There is a methyl radical on the 3rd carbon as a branch.

a) Write the structural formula of this compound. (2)

b) Identify the category of organic compound. (1)

(Score 3, Time 5 minute)

Learning outcome

- Writes the structural formula of different isomers.

18. $CH_3 - CH_2 - CH_2 - CH_2 - OH$

a) Write the structure of a chain isomer of this compound. (1)

b) Write the IUPAC name of a position isomer of the given compound. (1)

c) Write the structure of the functional isomer of the given compound. What is the name of the functional group in the isomer. (1)

(Score 4, Time 6 minute)

Learning outcome

- Writes the IUPAC names of alkenes. The structural formula of an alkene is given.

19. $CH_3 - CH_2 - CH = CH_2$

a) Write the IUPAC name of this organic compound. (1)

b) Give the structure of the alicyclic compound having the same molecular formula. Write its IUPAC name. (2)

(Score 3, Time 5 minute)

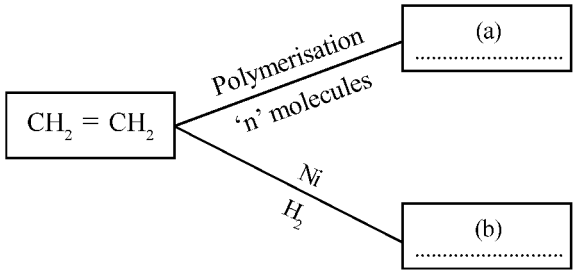
7

CHEMICAL REACTIONS OF ORGANIC COMPOUNDS

Learning outcome

- Identifies the specialties of addition and polymerisation, and writes the products formed by the reaction.

1. Analyse the reactions and answer the following questions.



a) Identify a, b. (1)

b) Write the name of the compound 'a'. (1)

c) Write the name of the reaction by which 'b' is formed. (1)

(Score 3, Time 4 minute)

Learning outcome

- Identifies the features of the reactions – addition, substitution and combustion.

2. Some reactions of propane are given.

i) Hydrogen atoms are substituted one by one, in presence of sunlight.

ii) When heated in the absence of air, it decomposes to hydrocarbons with lesser molecular mass.

iii) Combines with oxygen to give CO_2 and H_2O.

a) Identify the type of reaction in each case. (3)

b) Write the chemical equation of the reaction (ii). (1)

(Score 4, Time 4 minute)

Learning outcome

- Knows about the production of methanol, ethanoic acid and ester.

3. Analyse the reactions and answer the following questions.

(i) $CH_3 - OH + CO \xrightarrow{\text{Catalyst}} \underline{\quad A \quad}$

(ii) $CO + 2H_2 \xrightarrow[573\ K,\ 200\ atm]{\text{Catalyst}} \underline{\quad B \quad}$

(iii) $A + B \xrightarrow{\text{Con. } H_2SO_4} \underline{\quad C \quad} + H_2O$

a) Identify A, B, C. (2)

b) What is the general name/class to which product 'C' belongs? Write the IUPAC name. (2)

(Score 4, Time 7 minute)

Learning outcome

- Knows about addition, substitution and thermal cracking.

4. Analyse the given reactions and answer the following questions.

$$CH_3 - CH_2 - CH_3 \xrightarrow{\text{Thermal cracking}} \underline{\quad A \quad} + CH_4$$

$$\underline{\quad A \quad} \xrightarrow{Ni,\ H_2} CH_3 - CH_3$$

$$CH_4 \xrightarrow[\text{Sunlight}]{Cl_2} \underline{\quad B \quad} + HCl$$

a) Identify A and B. (2)

b) What is the name of reaction by which 'B' is formed? (1)

(Score 3, Time 6 minute)

Learning outcome

- Knows about the production of ethanol and ester.

5. Some reactions regarding the production of ethanol are given below.

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{Invertase}} C_6H_{12}O_6 + \underline{\quad A \quad}$$

$$A \xrightarrow{\text{Zymase}} \underline{\quad B \quad} + 2CO_2$$

a) Identify A and B. (2)

b) Write the name of the ester formed when the product B reacts with propanoic acid. (1)

c) Write the chemical equation for the formation of the ester. (1)

(Score 4, Time 5 minute)

Learning outcome

- Writes the chemical equation of addition reactions.

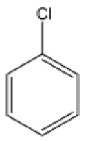
6. Acetylene (ethyne) is prepared in the laboratory by reacting calcium carbide with water. Write the chemical equations of the reactions for converting it to ethane.

(Score 2, Time 4 minute)

Learning outcome

- Writes the structure of aromatic compounds and the functional groups attached to them.

7. Complete the table.

Name of compound	Functional Group	Structure
Chlorobenzene	– Cl	
Phenol	(a)	(b) .....
Nitro benzene	(c)	(d) .....
Benzoic acid	(e)	(f) .....
Toluene	(g)	(h) .....

(Score 4, Time 6 minute)

Learning outcome

- Writes the structure of benzene, benzene with functional groups attached to it and IUPAC name.

8. a) Write the structure of the organic compound with molecular formula C_6H_6. (1)

b) What is the name of the compound formed when one hydrogen atom of benzene is replaced with methyl radical? Write the structure. (2)

(Score 3, Time 5 minute)

Learning outcome

- Knows about addition and polymerisation reactions.

9. Two equations are given below.

(i) $CH \equiv CH + HCl \rightarrow \underset{A}{\ldots\ldots}$

(ii) $n\,A \rightarrow B$

a) Identify A and B. (2)

b) Identify the type of reaction (i)? (1)

(Score 3, Time 4 minute)

Learning outcome

- Knows about addition, substitution and thermal cracking.

10. Three equations are given below.

(i) $CH_3 - CH_2 - CH_2 - CH_3 \xrightarrow{\text{Thermal cracking}} CH_3 - CH_3 + P$

(ii) $P + H_2 \xrightarrow{Ni} Q$

(iii) $Q + Cl_2 \xrightarrow{\text{Sunlight}} R$

a) Identify P, Q, R. (3)

b) Identify the name of the chemical reaction (ii) and (iii).

c) Write the IUPAC name of R. (1)

(Score 4, Time 5 minute)

Learning outcome

- Identifies the chemical reactions for the production of ethanol.

11. Ethanol is an industrially important compound.

a) What is the name of 5 - 8% solution of ethanol? (1)

b) How it is converted into rectified spirit? (1)

c) What is denatured spirit? (1)

(Score 3, Time 5 minute)

Learning outcome

- Writes the uses of various organic compounds.

12. Uses of some important organic compounds are given. Pick out the suitable compounds from the box.

Power alcohol, Teflon, Polythene, Ethanoic acid, Ethanol

a) For the preparation of rayon.
b) For making the coating of inner surface of non-stick cookware.
c) Solvent in paint industry.
d) As fuel in motor vehicles.

(Score 2, Time 3 minute)

Learning outcome

- Identifies various reactions.

13. Some reactants, products and names of reaction are given in the table. Complete it.

Reactant	Product	Name of chemical reaction
$CH_4 + Cl_2$	CH_3Cl	.....(a).....
$CH_3–CH_2–CH_3$	CH_4 + ...(b).....	Thermal cracking
$CH_2 = CH_2$ + ...(c).....	$CH_3–CH_2Br$	.....(d).....
$CH_3–CH_3 + O_2$	CO_2 + ...(e).....	.....(f).....
$nCH_2 = CH_2$	.....(g).....	.....(h).....

(Score 4, Time 4 minute)

Learning outcome

- Identifies the features of compounds which undergo addition and thermal cracking.

14. Pick out the suitable compounds from the box for the following reactions.

CH_4, C_2H_4, C_3H_8, CH_3Cl

a) Thermal cracking
b) Addition reaction

(Score 2, Time 3 minute)

8

CHEMISTRY FOR HUMAN PROGRESS

Learning outcome

- Explains the components of petroleum and their uses.

1. a) Which method is used to separate the various components from petroleum? (1)
   b) Write any two components from petroleum and their uses. (2)
   c) What are the two factors influencing the properties of a fuel? (1)

(Score 4, Time 8 minute)

Learning outcome

- Knows the components of LPG, its combustion and environmental hazards.

2. a) Which is the main component of LPG used as cooking gas? (1)
   b) What are the products formed by the combustion of this component? Write the balanced chemical equation of the reaction. (2)
   c) How the excessive consumption of fossil fuels affect the environment? Explain. (1)

(Score 4, Time 6 minute)

Learning outcome

- Identifies the different varieties of coal, its use, and limitations.

3. Different varieties of coal are given.

Lignite, Anthracite, Bituminous coal, Peat

a) Which among the above has highest carbon content and which one has the least? (1)
b) What is carbonisation? (1)
c) Write any two uses of coal. (1)
d) List any two environmental problems caused by the excessive consumption of coal. (1)

(Score 3, Time 5 minute)

Learning outcome

- Explains the use of thermal cracking in the production of LPG.

4. (a) a) Complete the following equation.

$$CH_3–CH_2–CH_2–CH_2–CH_2–CH_2–CH_3 \xrightarrow{Heat} CH_3–CH_2–CH_2–CH_3 + \overset{A}{.....}$$

(1)

b) Identify the name of this reaction? (1)

c) How this reaction can be made use of for the production of LPG? (2)

(Score 4, Time 6 minute)

Learning outcome

- Identifies the functions of medicine and the unhealthy practices in its use.

5. a) Paracetamol is a medicine which lowers the body temperature. Identify the category of medicines to which paracetamol belongs. (1)

b) What is the function of an antibiotic? (1)

c) Write any two unhealthy practices in the usage of medicines. (2)

(Score 4, Time 6 minute)

Learning outcome

- Explains the production of cement and its use.

6. a) What are the raw materials used for the production of cement? (1)

b) What is the role of gypsum in cement? (1)

c) Workers wear boots while handling concrete mixture. Why? (1)

d) Opened packets of cement are never kept for long time. Explain the reason. (1)

(Score 4, Time 8 minute)

Learning outcome

- Knows the production and uses of glasses.

7. a) Pick out the glass suitable for the given uses.

Flint glass, Borosilicate glass, Soft glass

i) Making laboratory equipment
ii) Making mirrors
iii) Making lenses

b) Which raw material is used to make all kinds of glasses?

(Score 2, Time 4 minute)

Learning outcome

- Applies green chemistry in daily life by identifying its importance.

8. a) What is meant by green chemistry? (1)
   b) List any four goals of green chemistry. (2)

(Score 3, Time 5 minute)

Learning outcome

- Identifies the chemicals used to make materials with industrial importance.

9. Some raw materials which are used to make industrially useful products are given.

- Silicon dioxide
- Limestone
- Cobalt oxide
- Alizarin
- Potassium carbonate
- Clay

a) Which substances are used to make cement? (1)
b) Which substances are used to make hard glass? (1)
c) Which substance is used to impart colour to glass? (1)
d) Which chemical is used as natural dye? (1)

(Score 4, Time 5 minute)

Learning outcome

- Identifies the types of medicine and their functions.

10. The pharmacist commented that the medicine in the prescription of the doctor has analgesic and antipyretic nature. What is the difference between these two types of medicines?

(Score 2, Time 3 minute)

Learning outcome

- Identifies the chemical nature of the materials used in daily life.

11. Match the following.

Substance	Structure/components	Use
• Cement	• Benzene, aniline, phenol etc.	• Mirrors, window panes, lenses
• Synthetic dyes	• Mixture of silicates and aluminates	• Construction of buildings
• Petro chemicals	• Mixture of silicates	• To give colour to objects
• Glass	• Obtained by the fractional distillation of petroleum	• Manufacture of cosmetics, wax, boot polish, plastic etc.

(Score 4, Time 5 minute)

Learning outcome

- Explains the manufacture of cement and its use.

12. a) Lime stone and clay are the raw materials used in cement manufacture. Write the process of the manufacture in brief. (2)

b) What is setting of cement? Write any one speciality of this process. (2)

(Score 4, Time 6 minute)

Part - B

SCORING INDICATORS

Unit 1

PERIODIC TABLE AND ELECTRONIC CONFIGURATION

Qn. No.	Scoring indicators	Split up Score	Total Score
1.	a) B	1	
	b) C	1	
	c) Period number - 3, Period number = No. of shells	½ + ½	
	d) B, D	½ + ½	4
2.	a) $FeSO_4$	1	
	b) $Fe_2(SO_4)_3$	1	
	c) Fe^{3+} - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5$	1	
	d) The energy difference between the outer most 's' subshell and penultinate 'd' subshell is very small. Hence under suitable conditions the electrons in 'd' subshell also take part in chemical reaction.	1	4
3.	iii) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$	½ + ½	
	iv) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^2$	½ + ½	2
4.	a) $^-2$	½	
	b) 1	½	
	c) 17	½	
	d) $^-1$	½	
	e) 12	½	
	f) $^+2$	½	3
5.	a) Y = $^-2$ (oxidation state of X is $^+4$)	1 + 1	
	b) Al_2Y_3	1	3
6.	a) b	½	
	b) d	½	
	c) e	½	
	d) f	½	2
7.	a) A - $1s^2\ 2s^2\ 2p^4$	½	
	B - $1s^2\ 2s^2\ 2p^6$	½	
	C - $1s^2\ 2s^2\ 2p^6\ 3s^2$	½	
	D - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$	½	
	b) B, D	½ + ½	
	c) CA (C_2A_2 is simplified and written as CA)	1	4
8.	a) P - $1s^2\ 2s^2\ 2p^6\ 3s^2$	½ + ½	
	Q - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$		
	b) P = $^+2$, Q = $^-2$	½ + ½	
	c) Right, valency of both P and Q is '2'.	1 + 1	4

<table>
<tr><th>Qn. No.</th><th>Scoring indicators</th><th>Split up Score</th><th>Total Score</th></tr>
<tr><td>9.</td><td>
<table>
<tr><th>Block</th><th>Outermost electronic configuration</th><th>Characteristics</th></tr>
<tr><td>s</td><td>$3s^1$</td><td>Highest atomic radius in the respective periods</td></tr>
<tr><td>p</td><td>$3p^5$</td><td>High electronegativity</td></tr>
<tr><td>d</td><td>$3d^4 4s^2$</td><td>Most of the compounds are coloured</td></tr>
<tr><td>f</td><td>$4f^1 5d^1 6s^2$</td><td>Includes Lauthanides (sixth period)</td></tr>
</table>
</td><td>4</td><td></td></tr>
<tr><td>10.</td><td>a. Si - $1s^2 2s^2 2p^6 3s^2 3p^2$
Ni - $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$
b. Si - Period number - 3, group number - 14
Ni - Period number - 4, group number - 10</td><td>1
1
1
1</td><td>4</td></tr>
<tr><td>11.</td><td>a. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2$
b. Group number - 8, Block - d
c. All of them are metals, d - block elements are placed in group 3 to group 12, produce coloured compounds, shows variable valency (any two)
d. s – Sub shell</td><td>1
½ + ½

½ + ½
1</td><td>4</td></tr>
<tr><td>12.</td><td>a. Group number - 14, Block - P
b. ACl_4
c. $1s^2 2s^2 2p^6 3s^2 3p^2$</td><td>½ + ½
2
1</td><td>4</td></tr>
<tr><td>13.</td><td>a. G
b. F
c. The element having highest atomic radius - A
The element having lowest atomic radius - H
d. D, C
e. H</td><td>½
1

½ + ½
½ + ½
½</td><td>4</td></tr>
<tr><td>14.</td><td>a. A, E
b. B, E
c. C
d. E</td><td>½ + ½
½ + ½
1
1</td><td>4</td></tr>
<tr><td>15.</td><td>a. Element X has constant oxidation state. Y shows variable oxidation states.
b. Writes electronic configuration of X and Y.
Y is a transitional element. In chemical reactions only two elections in ‘s’ subshell or besides ‘s’ subshell electrons ‘d’ subshell electrons also take part.</td><td>1
1

1</td><td>3</td></tr>
</table>

Unit 2

MOLE CONCEPTS

Qn. No.	Scoring indicators	Split up Score	Total Score
1.	a) 6.022×10^{23} b) i) 6.022×10^{23} ii) $2 \times 6.022 \times 10^{23}$ iii) $\frac{32}{12} \times 6.022 \times 10^{23}$	1 3	4
2.	a) A, D/2g Hydrogen, 8g Helium B, C/16g Oxygen, 14g Nitrogen b) A, D - $2 \times 6.022 \times 10^{23}$ B, C - 6.022×10^{23}	1+1 1+1	4
3.	a) 1:3 b) a - 2 NH_3, b - 1H_2, c - 12 H_2, d - 4 NH_3	1 ½ x 4 = 2	3
4.	a) 2:1 b) 500 O_2 molecules c) 1000 H_2O molecules	1 1 1	3
5.	a) 6.022×10^{23} b) 6.022×10^{23} c) 71g d) 14g	 ½ x 4 = 2	2
6.	a) 68g NH_3, 128g O_2 b) 49 g H_2SO_4	2 1	3
7.	Correct statements - a, c • No. of molecules in 2 mol chlorine is $2 \times 6.022 \times 10^{23}$ • Mass of 0.5 mol water is 9 g. So it contains $0.5 \times 6.022 \times 10^{23}$ H_2O molecules.	1 1½ 1½	4
8.	a - $2 \times 6.022 \times 10^{23}$ b - 1 GMM c - 6.022×10^{23}	 3	3
9.	a) Molecular mass of $CO_2 = 12 \times 1 + 16 \times 2 = 12 + 32 = 44$ No. of moles in 67.2L CO_2 at STP = $\frac{67.2L}{22.4L}$ =3 Mass of 3 mol $CO_2 = 3 \times 44 = 132$ g b) $3 \times 6.022 \times 10^{23}$	½ ½ 1 1	3
10.	(a) 2 (b) $2 \times 6.022 \times 10^{23}$ (c) 17 g (d) 51 g (e) 3 (f) 3×22.4 L	 ½ x 6 = 3	3
11.	a) 2 mol b) Amount of CO_2 produced by the combustian of 16 g CH_4 = 44 g Amount of CO_2 produced by the combustian of 1g CH_4 = $\frac{44}{16}$ g Amount of CO_2 produced by the combustian of 100 g CH_4 = $\frac{44}{16} \times 100$ g	1 1 1	3

Qn. No.	Scoring indicators	Split up Score	Total Score
12.	a) 0.25	1	
	b) $M = \frac{n}{v} = \frac{0.25}{2} = 0.125$	2	
	c) Add 250 mL water in 45 g glucose	1	4
13.	a) No. of moles in 320 g $SO_2 = \frac{320}{64} = 5$	1	
	(Equal volume of all gases at STP will contains equal number of molecules)		
	$\therefore$ Mass of 5 mol $NO_2 = 5 \times 46 = 230$ g	1	
	b) $5 \times 6.022 \times 10^{23}$	1	3
14.	a) 112 L	1	
	b) Volume of water obtained when 224L hydrogen completely reacts with oxygen = 224 L	1	
	No. of moles in 224L water $= \frac{224}{22.4} = 10$		
	Mass of 10 mol water = $10 \times 18 = 180$ g	1	3
15.	a - 67.2L, b - 132 g, c - $\frac{1}{4}$, d - 4g, e - 11.2 L, f - $\frac{1}{2}$	½ x 6 = 3	3
16.	a) 10 mol	1	
	b) $2NO_{(g)} + O_{2(g)} \rightarrow 2NO_2$ (2 : 1 : 2)		
	No. of moles in 112 L $O_2 = \frac{112}{22.4} = 5$ mol	1	
	According to equation no. of moles of NO_2 obtained by reacting oxygen completely with nitric oxide = 2		
	$\therefore$ No. of moles of NO_2 obtained by reacting 5 mol oxygen completely = 10		
	Mass of 10 mol $NO_2 = 10 \times 46 = 460$g	1	3
17.	a) $CaCO_3 \rightarrow CaO + CO_2$		
	100 g 56 g 44 g		
	1 1 : 1		
	Amount of $CaCO_3$ required to get 56 g of CaO = 100g	½	
	Amount of $CaCO_3$ required to get 1 g of CaO = $\frac{100}{56}$	½	
	Amount of $CaCO_3$ required to get 224 g of CaO	1	
	$\frac{100}{56} \times 224 = 400$g		
	b) $4 \times 6.022 \times 10^{23}$	1	3
18.	a) Mass of 20 mol NaCl = $20 \times 58.5 = 1170$ g	1	
	1170 g NaCl can be made into 11 packets with 100g each		
	b) Remaining NaCl = 1170 - 1100 = 70 g	1	3

Unit 3

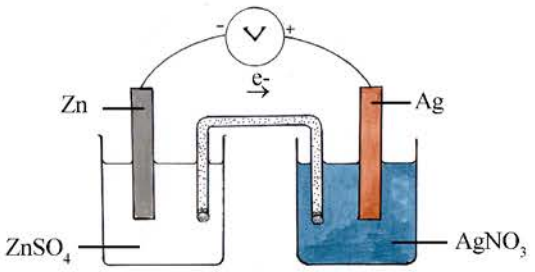
RATE OF CHEMICAL REACTIONS AND CHEMICAL EQUILIBRIUM

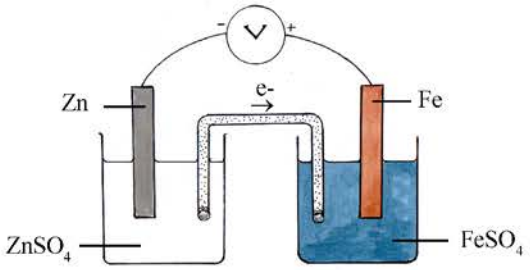
Qn. No.	Scoring indicators	Split up Score	Total Score
1.	a) Rate of reaction = $\frac{\text{Amount of reactants used}}{\text{Time taken for consumption of the reactants}}$	1	
	b) Rate of reaction = $\frac{5}{2}$ = 2.5g/m	1	2
2.	a) Test tube - A	1	
	b) Concentration	1	
	c) When the concentration of reactants increases, the number of molecules per unit volume and the number of effective collisions increases.	2	4
3.	a) Increases the rate of reaction	1	
	b) When pressure increases volume decreases, molecules come closer. Thus number of molecules per unit volume and rate of collision increases.	2	3
4.	a) Test tube - 2	1	
	b) When solids are made into small pieces/powder, their surface area increases. As a result the number of molecules undergoing effective collisions also increases.	2	
	c) Fire wood burns faster when cut into small pieces. **OR** Spices are used in powder form when cooking.	1	4
5.	a) X - Fe $(CNS)_3$, dark red colour.	1	
	b) The red colour of the solution intensifies.	1	
	c) Intensity of the red colour of the solution is reduced.	1	
	d) The system at equilibrium both reactants and products co-exist.	1	4
6.	a) B - forward reaction C - backward reaction	1	
	b) Equilibrium	1	
	c) No	1	
	At equilibrium rate of both forward and backward reactions are equal	1	4
7.	a) Test tube which contains hot water.	1	
	b) Temperature	1	
	When temperature increases the number of molecules with threshold energy increases. As a result number of effective collisious increases.	2	4

Qn. No.	Scoring indicators	Split up Score	Total Score
8.	a. For writing two methods (concentration, pressure, temperature) b. For writing reasons each	2 2	4
9.	a. Increases the rate of forward reaction. b. No effect c. Increases the rate of backward reaction.	1 1 1	3
10.	a. Increase the concentration of oxygen. b. States Le-Chatlier's principle. c. When the concentration of any one of the reactants increased the system will try to attain equilibrium by increasing the forward reaction.	1 1 1	3
11.	a. Vanedium pentoxide/V_2O_5 b. Catalyst increases the rate of both the forward and backward reactions to the same extent.	1 1	2
12.	a. MnO_2 b. Increases the rate of reaction	1 1	2
13.	a. When temperature decreases exothermic reaction increases ie., forward reaction increases. b. But low temperature rate of forward and backward reaction is slow.	2 2	4
14.	a. iii - $N_2 + 3H_2 \rightleftharpoons 2NH_3$ In first reaction NH_4Cl is solid compound. In second reaction number of reactants and product molecules are equal. b. When pressure increases, rate of forward reaction increases.	1 ½ ½ 1	3
15.	The catalyst increases the rate of both the forward and the backward reactions to the same extent. As a result the system reaches equilibrium at a faster rate.	1 1	2
16.	Forward reaction is an exothermic. Number of reactant and product molecules are equal.	1 1	2
17.	a. - Increase the amount of product. b. - Increase the amount of product. c. - Decrease the amount of product. d. - Increase the amount of product.	½ x 4	2

Unit 4

Reactivity Series and Electro Chemistry

Qn. No.	Scoring indicators	Split up Score	Total Score
1.	a) Mg reacts with hot water liberating hydrogen. Copper does not react with hot water.	1	
	b) $2\ Na + 2H_2O \rightarrow 2NaOH + H_2$	1	
	c) Na>Mg>Cu	1	3
2.	a) Aluminium, $4Al + 3O_2 \rightarrow 2Al_2O_3$	2	
	b) Na reacts with air (oxygen) and water.	1	3
3.	a) Writes the procedure.	1	
	Observation: Magnesium reacts with dil hydrochloric acid copper does not react with the acid	2	
	b) Hydrogen	1	4
4.	a) Copper is deposited on iron rod and the blue colour of copper sulphate solution decreases	1	
	b) $Fe \rightarrow Fe^{2+} + 2e^-$		
	$Cu^{2+} + 2e^- \rightarrow Cu$	½ + ½	
	c) No change occurs. Reactivity of silver is less than that of copper/ In the reactivity series the position of silver is below to copper.	2	4
5.	a) Hydrogen	1	
	b) Colour changes to pink. The presence of sodium hydroxide (alkali nature)	1	2
6.	a) Most reactive metal - A		
	Least reactive metal - B	½ + ½	
	b) A, Reactivity of A is higher than B.	2	
	c) $A + C^{2+} \rightarrow A^{2+} + C$	1	4
7.	a) 	2	
	b) Anode - Zn, Cathode - Ag	½ + ½	
	$2Ag^+ + 2e^- \rightarrow 2\ Ag$	1	4

Qn. No.	Scoring indicators	Split up Score	Total Score
8.	a) Iron reacted with steam heated to high temperature. b) Iron displaces copper from blue vitriol (copper sulphate) solution	1 1	2
9.	a. Chlorine/Cl_2 b. $2Cl^- \rightarrow Cl_2 + 2e^-$, $Cu^{2+} + 2e^- \rightarrow Cu$ c. Galvanic cell - Chemical energy is converted to electrical energy Electrolytic cell - Electrical energy is changed to chemical energy	1 ½ + ½ 2	4
10.	a. i) Hydrogen ii) Chlorine iii) Chlorine iv) Hydrogen b. List two areas.	 ½ x 4 2	4
11.	Correct the mistakes and draw the figure.  	2	2
12.	a. $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$ b. Colour turns pink. Presence of sodium hydroxide in the solution.	1 2	3
13.	a) Cell 1 Anode - $Mg \rightarrow Mg^{2+} + 2e^-$ Cathode - $Zn^{2+} + 2e^- \rightarrow Zn$ Cell 2 Anode - $Zn \rightarrow Zn^{2+} + 2e^-$ Cathode $Ag^+ + le^- \rightarrow Ag$ b) Ag. Lesser tendency to give up electron/less reactive metal	 1 1	2
14.	a) $Zn \rightarrow Zn^{2+} + 2e^-$ b) $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$ c) $Fe \rightarrow Fe^{2+} + 2e^-$ d) $2Ag^+ + 2e^- \rightarrow 2\ Ag$ e) $Pb^{2+} + 2e^- \rightarrow Pb$ f) $Mg + Pb^{2+} \rightarrow Mg^{2+} + Pb$	1 ½ x 6	3
15.	a) A - Zn, B - $FeSO_4$/Solution of Iron b) from Zn to Fe c) Anode $Zn \rightarrow Zn^{2+} + 2e^-$ Cathode $Fe^{2+} + 2e^- \rightarrow Fe$	1 1 1 1	4
16.	a) Cu^{2+}, Cl^-, H_2O b) $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$ c) Na^+, Cl^- d) $Na^+ + le^- \rightarrow Na$ e) $2Cl^- \rightarrow Cl_2 + 2e^-$ f) $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$	1 ½ x 6	3
17.	a) Silver is deposited in copper rod Colour of solution changes to blue b) $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$ c) $2Ag^+ + 2e^- \rightarrow 2Ag$ (Reduction) $Cu \rightarrow Cu^{2+} + 2e^-$ (Oxidation)	 1 1 1 1	4

Unit 5

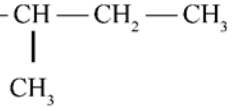
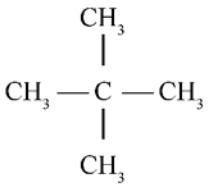
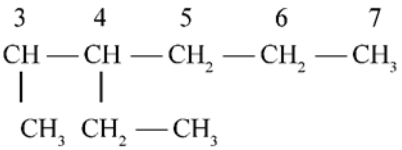
PRODUCTION OF METALS

Qn. No.	Scoring indicators	Split up Score	Total Score
1.	Aluminium - Bauxite Zinc - Calamine Iron - - Haematite Copper - Cuprite	½ ½ ½ ½	2
2.	i) Froth floatation ii) Magnetic separation iii) Leaching iv) Levigation	1 1 1 1	4
3.	a) Write the difference between Calcination and Roasting. b) Zinc carbonate ore is converted to Zinc oxide.	2 1	3
4.	a) Liquation - Tin, Lead Electrolytic refining - copper Distillation - Mercury, Zinc b) Boiling point of mercury is low. Melting point of Tin is low.	1 1 1 ½ ½	4
5.	a) Al b) Au c) Cu d) Zn	1 1 1 1	4
6.	In ores metals are in positive oxidation state. Reducing agent is needed (electron giving substance) to get the metal.	1 + 1	2
7.	a) CO. Oxygen in the blast of hot air reacts with coke to form CO_2. This CO_2 again reacts with coke to produce CO. b) SiO_2 CaO c) $CaO + SiO_2 \rightarrow CaSiO_3$	2 ½ + ½ 1	4
8.	a) Pig Iron mixed with scrap iron and coke, is melted in a special furnace to make cast iron. b) Molten cast iron expands a little on solidification.	1 1	2
9.	a) Fe, Ni, Al, Co b) For the manufacture of permanent magnets. c) Stainless steel d) For making heating coils.	½ x 4 = 2	2
10.	Order: (ii), (iii), (iv), (i)	½ x 4 = 2	2

Qn. No.	Scoring indicators	Split up Score	Total Score
11.	a) Aluminium compounds are very stable. i) The melting point of alumina is very high. Cryolite is added to alumina to reduce its melting point and increase its electrical conductivity. ii) Oxygen liberated at the anode reacts with carbon, forming CO_2. iii) $Al^{3+} + 3e^- \rightarrow Al$	1 1 1 1	 4
12.	a. Copper refining - diagram b. Anode $Cu \rightarrow Cu^{2+} + 2e^-$ Cathode $Cu^{2+} + 2e^- \rightarrow Cu$ As oxidation and reduction takes place it is a redox reaction.	2 2	 4
13.	a. Bauxite, $Al_2O_3 . 2H_2O$ b. Give two features of an ore	2 2	 4
14.	CaO is formed by the decomposition of $CaCO_3$. This CaO acts as a flux and combines with SiO_2 (gangue) to form $CaSiO_3$ (slag)	2	2
15.	a. Calcination b. Leaching	1 1	 2
16.	a. $NaAlO_2$/ (Sodium aluminate) b. $Al(OH)_3$/(Aluminium hydroxide) c. The precipitate is separated, washed well and strongly heated. d. Al_2O_3	 ½ x 4	 2

Unit 6

NOMENCLATURE OF ORGANIC COMPOUNDS

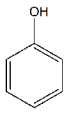
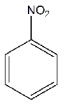
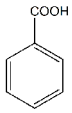
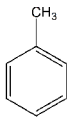
Qn. No.	Scoring indicators	Split up Score	Total Score
1.	a) C_7H_{16} b) $CH_3—CH_2—CH_2—CH_2—CH_2—CH_2—CH_3$ c) Hexane d) $CH_3—CH_2—CH_2—CH_2—CH_2—CH_3$	 ½ + ½ ½ + ½	2
2.	a)  b) C_5H_{12} c) $CH_3—CH_2—CH_2—CH_2—CH_3$ or  d) Pentane/2, 2-dimethylpropane	1 1 1 1	4
3.	a) For drawing structure b) For writing IUPAC name c) Writes a structure of a position isomer	1 1 1	3
4.	a) C b) Methyl c) 3-methylhexane	1 1 1	3
5.	a) 6 b) 2, 4 c) 2, 4-dimethylhexane	1 1 1	3
6.	a)  b) 4-ethyl-3-methylheptane	1 2	3
7.	i) a) $CH_3—CH_2—CO—CH_3/CH_3—CO—CH_2—CH_3$ b) Butan-2-one c) $CH_3—CH_2—CH_2—CHO$ ii) Functional isomerism	1 1 1 1	4

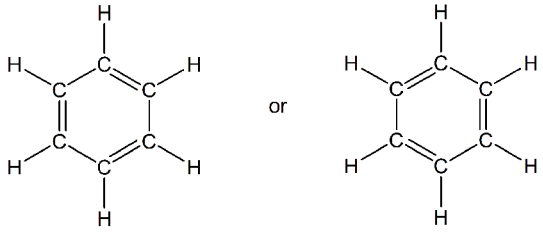
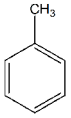
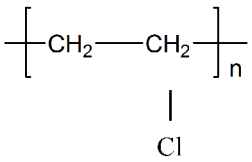
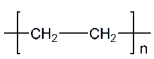
Qn. No.	Scoring indicators	Split up Score	Total Score
8.	a) ii & iv/$CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-CH_3$	1	
	& $CH_3-CH_2-CH_2-CH_2-OH$	1	
	Position isomerism	1	
	b) CH_3-CH_2-CHO Propanal	1	4
9.	a) Hydroxyl b) Amino c) Butan-1-amine d) $CH_3-CH_2-O-CH_2-CH_2-CH_3$	1 x 4	4
10.	i) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-CH_3$/$CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-CH_3$	1	
	$CH_3-O-CH_2-CH_2-CH_3$	1	
	$CH_3-CH_2-O-CH_2-CH_3$	1	
	ii) For writing a functional isomer pair	1	4
11.	a) 2-Methylpropane	1	
	b) C_4H_{10}	1	
	c) $CH_3-CH_2-CH_2-CH_3$	1	
	d) Chain isomerism	1	4
12.	a) Same molecular formula, Isomerism	1	
	b) No, In these functional groups are different	½ + ½	
	c) Hydroxyl, Alkoxy	½ + ½	3
13.	i) 3-Methylhexane	1	
	ii) Pent-2-ene	1	2
14.	a) General formula is C_nH_{2n} b) A alkene compound c) Similar to cyclohexane molecular formula d) IUPAC name Hex-2-ene	½ x 4	2
15.	<table><tr><th>Structural formula</th><th>IUPAC name</th><th>Molecular Formula</th></tr><tr><td>$CH_3-CH_2-\underset{\underset{CH_3}{|}}{CH}-C\equiv CH$</td><td>3-methyl Pent-1-yne</td><td>C_6H_{10}</td></tr><tr><td>$CH_2=CH-CH_2-CH_3$</td><td>But-1-ene</td><td>C_4H_8</td></tr><tr><td>$CH_3-C\equiv C-CH_2-CH_3$</td><td>Pent-2-yne</td><td>C_5H_8</td></tr><tr><td>$CH_3-CH_2-\underset{\underset{CH_3}{|}}{C}=CH_2$</td><td>2-methylbut-1-ene</td><td>C_5H_{10}</td></tr></table>	4	4
16.	a) Hex-3-yne	1	
	b) Writes the structural formula of any three isomers	3	4

Qn. No.	Scoring indicators	Split up Score	Total Score
17.	a) $CH_2 = CH - \underset{\displaystyle CH_3}{\underset{\vert}{CH}} - CH_2 - CH_3$	2	
	b) Alkene	1	3
18.	a) For writing a chain isomer	1	
	b) Butan-2-ol	1	
	c) $CH_3 - CH_2 - O - CH_2 - CH_3$/ $CH_3 - O - CH_2 - CH_2 - CH_3$	1	
	Alkoxy	1	4
19.	a) But-2-ene	1	
	b) Cyclobutane	2	3

Unit 7

CHEMICAL REACTIONS OF ORGANIC COMPOUNDS

Qn. No.	Scoring indicators	Split up Score	Total Score
1.	i) a) $-\left[CH_2-CH_2\right]_n-$ b) CH_3-CH_3	1	
	ii) Polythene	1	
	iii) Addition reaction	1	3
2.	a) i) Substitution reaction	1	
	ii) Thermal cracking	1	
	iii) Combustion	1	
	b) $CH_3-CH_2-CH_3 \rightarrow CH_2=CH_2+CH_4$	1	4
3.	a) A - CH_3-COOH	½	
	B - Methanol/CH_3-OH	½	
	C - $CH_3-COO-CH_3$	1	
	b) Esters, Methyl ethanoate	2	4
4.	a) A - $CH_2=CH_2$ b) B - CH_3Cl	1 + 1	
	b) Substitution reaction	1	3
5.	a) A - $C_6H_{12}O_6$ B - C_2H_5-OH	1 + 1	
	b) Ethyl propanoate	1	
	c) $CH_3-CH_2-COOH + HO-CH_2-CH_3 \rightarrow$ $CH_3-CH_2-COO-CH_2-CH_3 + H_2O$	1	4
6.	$CH \equiv CH + H_2 \xrightarrow{Ni} CH_2=CH_2$	1	
	$CH_2=CH_2 + H_2 \xrightarrow{Ni} CH_3-CH_3$	1	2
7.	a) $-OH$ b) 	½ x 8	4
	c) $-NO_2$ d) 		
	e) $-COOH$ f) 		
	g) $-CH_3$ h) 		

Qn. No.	Scoring indicators	Split up Score	Total Score
8.	a) 	1	
	b) Methyl benzene (Toluene) 	1	
		1	3
9.	a) A $CH_2 = CHCl$	1	
	B 	1	
	b) Addition reaction	1	3
10.	a) P - $CH_2 = CH_2$	½	
	Q - $CH_3 — CH_3$	½	
	R - $CH_3 — CH_2Cl$	½	
	b) (ii) Addition reaction	1	
	(iii) Substitution reaction	1	
	c) Chloroethane	½	4
11.	a) Wash	1	
	b) Fractional distillation of wash	1	
	c) Product obtained by adding poisonous (methanol, pyridine) substances	1	3
12.	a) Ethanoic acid b) Teflon c) Methanol d) Power alcohol	½ x 4	2
13.	a) Substitution reaction b) $CH_2 = CH_2$ c) HBr d) Addition reaction e) H_2O f) Combustion g)  h) Polymerisation	½ x 8	4
13.	a) C_3H_8	1	
	b) C_2H_4	1	2

Unit 8

CHEMISTRY FOR HUMAN PROGRESS

Qn. No.	Scoring indicators	Split up Score	Total Score
1.	a) Fractional distillation b) Writes two components and their uses. c) The number of carbon atoms in the carbon chain and the structure of the chain.	1 2 ½ + ½	4
2.	a) Butane b) CO_2, H_2O $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ c) Writes any two environmental problems.	½ ½ 1 1	4
3.	a) The coal which has the highest carbon content - Anthracite Coal which has the lowest carbon content - Heat b) Carbonisation - definition c) Writes two uses of coal. d) Writes two environmental problems.	½ ½ 1 ½ + ½ ½ + ½	4
4.	a) Propene ($CH_3 — CH = CH_2$) 1 b) Thermal cracking c) When heptane is subjected to thermal decomposition butane, which is the main constituent LPG is produced.	1 2	4
5.	a) Antipyretics b) To destroy the disease causing micro organisms and prevent their growth. c) Writes any two unhealthy practices	1 1 1 + 1	4
6.	a) Calcium carbonate and clay b) To control the setting time of cement c) Reaction between cement and water is an enothermic reaction d) Cement reacts with moisture and get hardened	1 1 1 1	4
7.	a) Borosilicate glass b) Soft glass c) Flint glass c) Silica (SiO_2)	½ x 4	2
8.	Writes the aims of green Chemistry and any four goals of green Chemistry.	1 + 2	3
9.	a) Lime stone, clay b) Potassium carbonate, Lime stone, Silicon dioxide c) Cobalt oxide d) Alizarin	1 x 4	4

Qn. No.	Scoring indicators	Split up Score	Total Score
10.	Analgesics - To relieve pain Antipyretics - To lower body temperature	1 1	2
11.	Cement - Mixture of silicates and aluminotes - construction of buildings Synthetic dyes - Benzene, aniline, phenol etc. - To give colour to objects Petrochemicals - obtained by the fractional distillation of petroleum - manufacture of cosmetics, wax, boot polish, plastic etc. Glass - mixture of silicates - mirrors, window panes, lenses.	1 x 4	4
12.	a. Writes a short description on the manufacture of cement. b. Cement combines with water and sets into a hardened mass. This process is an exothermic reaction.	2 1 + 1	4

PART - C

Model Question Papers

A

SSLC EXAMINATION, MARCH 2016
(Sample Question Paper)
CHEMISTRY

Standard: X **Time: 1½ Hour**
Score: 40

Instructions

1. 15 minutes cool off time. Use this time to read the questions carefully and prepare to write answers.
2. Answer only after reading the instructions and questions carefully.
3. Consider the time and score allotted for each question while answering.

1. Subshell electronic configuration of some elements are given below. (Symbols are not real)

   X - [Ne] $3s^2 3p^1$

   Y - [Ar] $4s^1$

   Z - [Ar] $3d^6 4s^2$

   a) Write the complete subshell electronic configuration of Y. (1)

   b) Which element show variable oxidation state. (1)

   c) Find the group number of Z? (1)

   d) Write the chemical formula of the compound formed between oxygen and Y. (1)

2. A reversible reaction is given below.

$$2SO_2 + O_2 \underset{}{\overset{V_2O_5}{\rightleftharpoons}} 2SO_3 + \text{Heat}$$

   What will be the effect of following conditions on forward reactionif this system is in equilibrium?

   a) SO_3 is removed from the system. (1)

   b) Pressure is decreased. (1)

3. Pick out 1M sodium hydroxide solution from the samples given below. (1)

   i) 1 Litre solution containing 20g NaOH

   ii) 1 Litre solution containing 10g NaOH

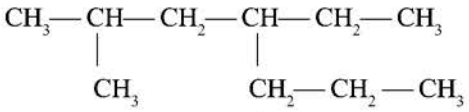
   iii) 500 mL solution containing 20g NaOH

   iv) 500 mL solution containing 10g NaOH

4. Complete the table. (3)

Concentration of ore	Ore/impurity characteristics
i) Levigation (Hydraulic washing)	..... (A) .....
ii) ..... (B)	Ore dissolves in a suitable solvent, But impurity doesn't.
iii) Froth floatation process	..... (C) .....

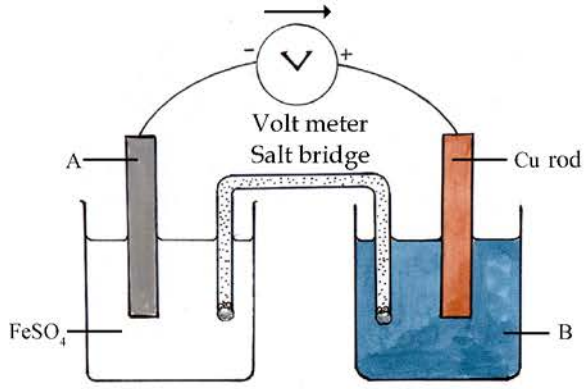
5. The structure of a hydrocarbon is given below.



a) How many carbon atoms are there in the main chain? (1)

b) Write the IUPAC name of the compound. (2)

6. The schematic diagram of a galvanic cell is given below.



a) Identify A and B. (1)

b) Identify the anode in this cell. Also, write the chemical equation for the reaction occurring at anode. (2)

7. Examine the following structures and answer the questions.

$CH_3—CH_2—COOH$	$CH_3—CH_2—CH_2—CHO$	$CH_3—CO—CH_3$
$CH_3—CH_2—Cl$	$CH_3—OH$	

a) Identify the compounds required to prepare an ester. (1)

b) Write the name of ester formed by these compounds. (1)

8. Analyze the chemical equation and answer the following questions.

$$2H_2\,(g) + O_2\,(g) \rightarrow 2H_2O\,(g)$$

a) How many moles of oxygen is required to react completely with 4 mol Hydrogen? (1)

b) How many atoms are there in water obtained by the complete combustion of 4 mol hydrogen? (1)

c) Calculate the volume of water vapour at STP when 10 gm hydrogen is completely burnt. (Hint: Atomic mass H – 1, O – 16) (2)

9. Identify P, Q and R in the following reactions. (3)

i) $CH_3 — CH = CH_2 + Cl_2 \xrightarrow{\text{Sunlight}} \text{.....(P).....}$

ii) $\text{.....(Q).....} \xrightarrow{\text{Heat}} CH_2 = CH_2 + CH_4$

iii) $nCH_2 = CH_2 \xrightarrow[\text{Catalyst}]{\text{Heat/Pressure}} \text{.....(R).....}$

10. Major chemical reactions occurring in blast furnace is given below.

$$CaCO_3 + \text{Heat} \rightarrow CaO + CO_2$$

$$CaO + SiO_2 \rightarrow CaSiO_3$$

$$C + O_2 \rightarrow CO_2$$

$$CO_2 + C \xrightarrow{\text{Heat}} 2CO$$

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

a) What are the substances added to blast furnace during the manufacture of iron? (1)

b) Identify the reaction where hematite undergo reduction. (1)

c) What is the function of calcium oxide in the manufacture of iron. (1)

11. This question has **choice**. Write answer for any one of the following.

A. Structural formulae of certain organic compounds are given below.

(i) $CH_3 — CH_2 — CH_2 — CHO$

(ii) $CH_3 — CH_2 — \underset{\displaystyle NH_2}{\underset{|}{CH}} — CH_3$

(iii) $CH_3 — CH_2 — \underset{\displaystyle OH}{\underset{|}{CH}} — CH_3$

(iv) $CH_3 — CH_2 — CO — CH_3$

a) Identify the isomer pair. (1)

b) Write the position isomer of the compound (iii). (1)

c) Identify the functional group in compound (ii). (1)

OR

B. Molecular formula of a compound is C_3H_6O.

a) Write the structural formulae of the functional isomers of this compound. (2)

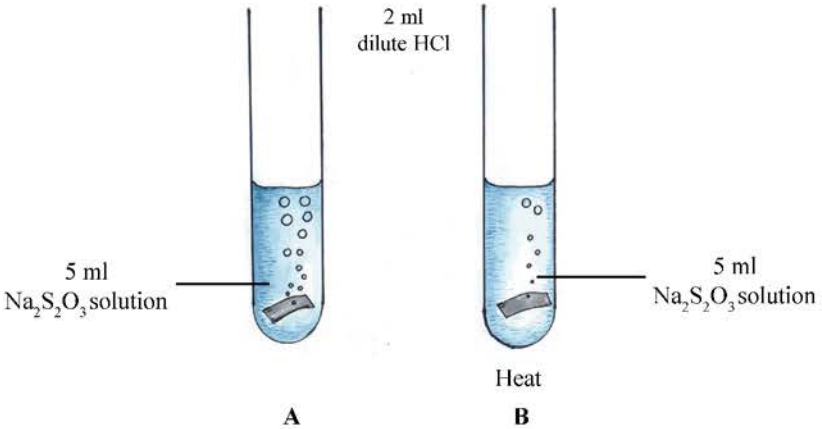
b) Write the IUPAC name of any one isomer. (1)

12. Sodium chloride solution is subjected to electrolysis using graphite electrodes.

a) Identify the gas released at cathode. (1)

b) What will be the color change if phenolphthalein is added to the resultant solution? Give reason. (2)

13. Analyze the following diagram and answer the questions.



In which test tube the rate of reaction is high? Substantiate your answer. (3)

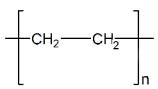
14. Medicines are used for curing and preventing various diseases.

a) Which category of medicines are used for reducing the body temperature during fever? (1)

b) Several unhealthy practices are there in our society in using medicines. Write any two such instances and suggest possible remedies for it. (2)

A

SCORING INDICATORS

Qn. No.	Scoring indicators	Split up Score	Total Score
1	(a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$ (b) Z (c) 8 (d) Y_2O	1 1 1 1	4
2	(a) Increases the rate of forward reaction (b) Decreases the rate of forward reaction	1 1	2
3	(iii)500 mL solution of 20g NaOH	1	1
4	A - Ore is lighter and impurities are heavier B - Leaching C - Ore is lighter and impurities are heavier	1 1 1	3
5	(a) 7 (b) 4-ethyl-2-methyl heptane (1 score for identifying the position and branches)	1 2	3
6	(a) A - Fe B - $CuSO_4$/any salt solution of Cu (b) Fe (iron) $Fe \rightarrow Fe^{2+} + 2e^-$	1 1 1	3
7	(a) $CH_3—CH_2—COOH$, $CH_3—OH$ (b) Methyl propanoate	1 1	2
8	(a) 2 mol (b) $3 \times 4 \times 6.022 \times 10^{23} / 12 \times 6.022 \times 10^{23} / 12 \times N_A$ (c) Number of moles $= \frac{10}{2} = 5$ 5 mole H_2 has a volume at STP = 5 x 22.4 = 112 L	1 1 1 1	4
9	(i) $CH_3—\underset{\displaystyle Cl}{\underset{\vert}{CH}}—CH_2Cl$ (ii) $CH_3—CH_2—CH_3$ (iii) 	1 1 1	3

Qn. No.	Scoring indicators	Split up Score	Total Score
10	(a) Hematite, coke, limestone/Fe_2O_3, C, $CaCO_3$ (b) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ (c) as a flux/to remove the gangue SiO_2	1 1 1	3
11	(a) $CH_3—CH_2—CH_2—CHO$, $CH_3—CH_2—CO—CH_3$ (b) $CH_3—CH_2—CH_2—CH_2OH$ (c) Amino **OR** (a) $CH_3—CH_2—CHO$, $CH_3—CO—CH_3$ (b) Propanal $CH_3—CH_2—CHO$/ Propanon - $CH_3—CO—CH_3$	1 1 1 1+1 1	3
12	(a) H_2 (b) Turns into pink colour. The presence of sodium hydroxide makes the solution alkaline	1 1 + 1	3
13	(a) In test tube B The number of molecules having threshold energy increases as temperature increases. The number of effective collision increases.	1 1 1	3
14	(a) Antipyretics (b) Avoid self-medication, use the prescribed dose (or any other two correct answers)	1 1 + 1	3

B

SSLC EXAMINATION, MARCH 2016
(Sample Question Paper)
CHEMISTRY

Standard: X **Time: 1½ Hour**
Score: 40

Instructions

1. 15 minutes cool off time. Use this time to read the questions carefully and prepare to write answers.
2. Answer only after reading the instructions and questions carefully.
3. Consider the time and score allotted for each question while answering.

1. How the rate of reaction changes under following circumstances when dilute hydrochloric acid and marble undergo chemical reaction? Give reason based on collision theory.
   a) Increase the concentration of HCl. (1)
   b) Marble powder is added. (2)
2. The outer shell electronic configuration of an element 'X' in 2nd period of periodic table ends as p^4. (Symbol is not real).
   a) Write down the complete electronic configuration of the element. (1)
   b) Identify the group to which this element belongs? (1)
   c) Write the chemical formula of the compound formed by this element with sodium (Na) in first group. (1)
3. Molecular mass of NaOH is 40. If one litre solution is prepared by dissolving 4g NaOH in water, what will be its molar concentration? (2)
4. During metallurgy, $ZnCO_3$ is subjected to calcination. However, Cu_2S undergoes roasting.
   a) Distinguish between Calcination and Roasting. (2)
   b) What is the chemical change occurring when $ZnCO_3$ is subjected to calcination? (1)
5. The major component in cooking gas is butane (C_4H_{10}).
   a) Write the chemical equation for the reaction when butane undergo combustion. (1)
   b) Identify the product obtained when butane undergoes thermal decomposition. (1)

   [C_5H_{10}, C_5H_{12}, C_3H_6, C_6H_{12}]

6. A. Assume that the volume of methane (CH_4) gas at STP is 224 L.

   a) Calculate the number of CH_4 molecules in it. (1)

   b) Express in grams the mass of same volume of nitrogen dioxide (NO_2) at STP?

   (Atomic mass N = 14, O = 16) (2)

OR

B. Analyse the following reaction and answer the questions. (Atomic mass N - 14, H - 1)

$N_2 + 3H_2 \rightarrow 2NH_3$

a) Calculate the number of moles of hydrogen required to get 10 mol ammonia. (1)

b) How many grams of N_2 is required to get 1700g NH_3? (2)

7. "Make ecofriendly products."

This is one of the main objectives of green chemistry. Explain using suitable examples. (2)

8. Certain chemical equations indicating reversible reactions are given below.

$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

Which of the above reaction has no effect on pressure changes? Substantiate your answer. (2)

9. Copper, sodium and magnesium are reacted with water in separate test tubes and observations are described below.

   I. Gas bubbles appeared only when water is heated.

   II. No reaction with cold or hot water.

   III. React violently with cold water.

   a) Identify the metal related to the first observation. (1)

   b) Arrange the metals in accordance with the decreasing reactivity with water. (1)

10. The raw materials used for the manufacture of glass are given below.

Calcium carbonate, Silicon dioxide, Potassium carbonate, Aluminum oxide, Lead oxide

Which glass is used for producing lenses? Pick out the materials from the above box for producing this type of glass. (2)

11. a) Different stages in the manufacture of a substance is given below. Fill in the blanks.

$$C_{12}H_{22}O_{11} + 2H_2O \xrightarrow{A} C_6H_{12}O_6 + C_6H_{12}O_6 \quad (1)$$

$$C_6H_{12}O_6 \xrightarrow{\text{Zymase}} \text{.....}\overset{B}{\text{.....}}\text{.....} + 2CO_2 \quad (1)$$

b) Which among the following compounds must react with the product 'B' to get an ester? (1)

[CH_3 — CHO, CH_3 — COOH, CH_3 — CH_2 — CH_2 — OH]

12. Identify the statements related to transition elements (d-block) from those given below.

- Most of them are radioactive elements.
- Oxides are acidic in nature.
- Give coloured compounds.
- Most of them are nonmetals.
- Show variable oxidation states. (2)

13. Two facts about the manufacture of an industrially important metal are given below:

- Ore is reacted with hot concentrated NaOH.
- For separating the metal, electricity is used as reducing agent.

a) Which metal is associated with the above facts? (1)

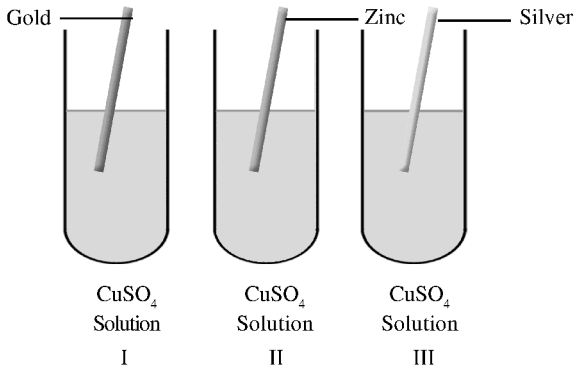
b) Why electricity is used as the reducing agent. (1)

14. Match the following.

A Functional group	B Common Name
1 –CHO	a) Amines
2 $-NH_2$	b) Ketones
3 –COOH	c) Aldehydes
	d) Carboxylic acids

(1) (1) (1)

15. Analyse the following diagram and answer the questions.



a) In which test tube a chemical reaction can be observed? Identify the changes observed. (2)

b) Write the chemical equation for the reaction. (1)

16. A hydrocarbon consisting of single bonds has five carbon atoms in the main chain. The third carbon atom has a branch as $-CH_3$.

a) Write the Structural formula of this hydrocarbon. (1)

b) Write the IUPAC name of it. (1)

c) Draw the structure of any one isomer of this hydrocarbon. (1)

B

SCORING INDICATORS

Qn. No.	Scoring indicators	Split up Score	Total Score
1	(a) When concentration increases, no of molecules increases, rate of collision increases. (b) • The surface area increases when added in powder form, and the no of molecules comes in contact increases. (c) • Rate of reaction increases as the collision rate increases.	1 1 1	3
2	(a) $1s^2\ 2s^2\ 2p^4$ (b) In 16^{th} group (c) Writes as Na_2X	1 1 1	3
3	4g NaOH = $\frac{4}{40}$ mol = 0.1 mol Molarity $\frac{0.1}{1L}$ = 0.1 M	1 1	2
4	a) Calcination – heating in the absence of air Roasting – heating in presence of air b) $ZnCO_3$ decomposes to give ZnO	1 1 1	3
5	(a) $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ (b) C_3H_6	1 1	2
6	(a) No. of moles = 10 Number of molecules = $10 \times 6.022 \times 10^{23}/10\ N_A$ (b) Molecular mass of NO_2 = 14 + 32 = 46 No. of moles = $\frac{224}{22.4}$ = 10 Mass = 10×46 = 460g **OR** (a) 15 mol H_2 (b) 1700 g NH_3 = $\frac{1700}{17}$ mol = 100 mol To get 100 mol NH_3 need 50 mol N_2 = 50 × 28 = 1400 g N_2	1 ½ 1 ½ 1 1 1	3

Qn. No.	Scoring indicators	Split up Score	Total Score
7	Explains with suitable examples.	2	2
8	Identifies as $H_2 + I_2 \rightleftharpoons 2HI$. Explain on the basis of the idea that there is no difference in the number of moles/molecules or pressure has no effect due to no difference in the volume.	1 1	2
9	(a) Identifies as magnesium (b) Na 〉 Mg 〉 Cu	1 1	2
10	Flint glass/optical glass Calcium carbonate, silicon dioxide, lead dioxide	1 1	2
11	(a) A - Invertase B - C_2H_5 — OH (b) CH_3 — COOH	1 1 1	3
12	Gives coloured compounds Shows variable oxidation states	1 1	2
13	(a) Aluminium/Al (b) Electricity is strong reducing agent/ Al is highly reactive	1 1	2
14	(a) 1 - c / Aldehydes (b) 2 - a / Amines (c) 3 - d / Carboxylic acid	1 1 1	3
15	(a) In 2nd test tube, the colour fades Copper gets deposited in zinc rod. (b) $CuSO_4 + Zn \rightarrow ZnSO_4 + Cu$	1 1 1	3
16	(a) $CH_3 — CH_2 — \underset{\displaystyle CH_3}{\underset{\vert}{CH}} — CH_2 — CH_3$ (b) 3-methyl pentane (c) Structure of any isomer	1 1 1	3

A

FIRST TERMINAL EVALUATION 2016

CHEMISTRY

Standard : X **Score : 40**

Time : 1½ hour

Instructions

1. First 15 minutes is given as cool off time. This time is to be used for reading and understanding the questions.
2. Write down answers for all questions.
3. The score for each question is given along with the question.

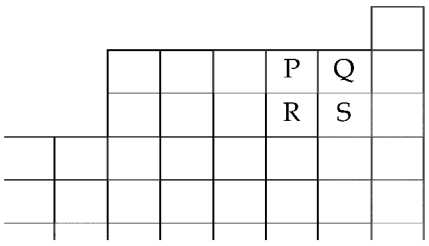
1. Select and write down the properties of S-block elements from the statements given below. (2)
   a) Metallic hydroxides show basic character
   b) Produces coloured compounds
   c) Produces ionic compounds
   d) Show different oxidation states
2. A few samples of elements are given below. Find out the number of GAM and the number of atoms in each of them. (Hint : Atomic mass : H=1, C=2) (2)
   a) 20 g hydrogen
   b) 24 g carbon
3. A) On heating ammonium chloride in a closed test tube, a white substance was seen to be deposited on the sides of the test tube.
   a) What is the white substance? (1)
   b) How is this product formed? (1)
   c) Write the chemical equations for this process. (2)

OR

B) A little hydrogen peroxide was taken in a test tube and a glowing incense stick was shown at the mouth of the test tube. A little manganese dioxide was added in the same test tube and the experiment was repeated.

a) In which situation did the glowing incense stick gave a bright flame? (1)
b) In this case, which factor influenced the speed of chemical reaction? (1)
c) Name the gas formed by the decomposition of hydrogen peroxide. (1)
d) Write the balanced chemical equation for this process. (1)

4. An incomplete portion of the periodic table is given below. The electronic configuration of the outermost subshell of the element Q is $2s^2 2p^5$ (These are not actual symbols).



a) What is the atomic number of P? (1)

b) Which element has higher ionization energy? (1)

c) Write the group number of R? (1)

d) Write the outermost sub shell electronic configuration of S. (1)

5. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ Examine the balanced chemical equation and write answers to the questions given below. (Atomic mass : C=12, O=16)

a) When 1 mole CH_4 burns, how many moles of CO_2 and H_2O are formed? (2)

b) How many grams of CO_2 is formed when 2 mol CH_4 burns? (2)

6. When one mol of each of the metal Zinc (Zn) and Magnesium (Mg) were allowed to react with HCl solutions of the same strength, Magnesium reacted faster and was fully consumed.

a) Which factor influenced the rate of reaction? (1)

b) Name the gas formed in this reaction? (1)

c) Write the balanced chemical equation for any one of these reactions. (1)

7. The electronic configuration of an element ends as $3d^5 4s^2$

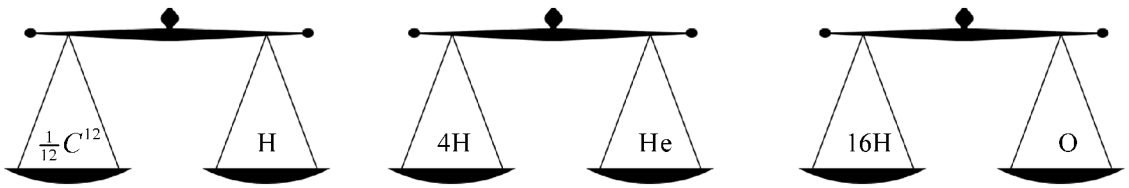
a) Write the complete electronic configuration. (1)

b) Is it a metal or a nonmetal? (1)

c) In which subshell does the filling of last electron take place? (1)

d) To which period does this element belong? (1)

8.



Analyse the picture and write answers to the questions given below.

(Hint : Atomic mass is expressed in terms of the mass of $\frac{1}{12}$ of a carbon -12 atom)

a) Which is the possible mass of a helium atom?

$\left[\frac{1}{12}C^{12} \times 2, \quad \frac{1}{12}C^{12} \times 4, \quad \frac{1}{12}C^{12} \times 8, \quad \frac{1}{12}C^{12} \times 16\right]$ (1)

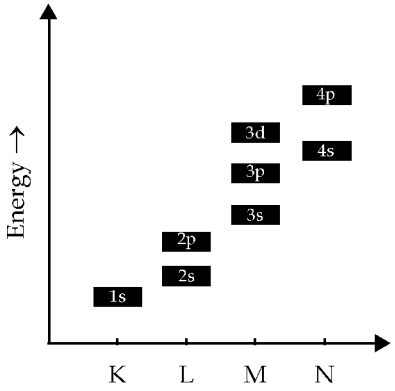
b) How many times will be the mass of an oxygen atom greater than the mass of $\frac{1}{12}C^{12}$ atom? (1)

9. Calcium carbonate reacts with dilute HCl to produce carbon dioxide. Assume that 5g of $CaCO_3$ react completely in two minutes.

   a) Calculate the rate of this reaction. (2)

   b) Suggest two methods to increase the rate of the reaction. (2)

10.



Analyse the graph and answer the following questions.

   a) Which sub shell is present in all the shells? (1)

   b) Write the energy sequence of the sub shells. (2)

11. Which one has greater mass among the following. (Atomic mass : H=1, C=12, O=16)

   a) 10 mol water (H_2O)

   b) 10 mol Carbon dioxide (CO_2) (3)

12. The sub shell electronic configurations of a few elements are given below. (These are not actual symbols).

   A - $1s^2\,2s^2\,2p^6\,3s^2\,3p^4$

   B - $1s^2\,2s^2\,2p^6\,3s^2\,3p^3$

   C - $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^3\,4s^2$

   D - $1s^2\,2s^2\,2p^6$

   a) Which elements belong to the same period? (1)

   b) Which is the transition element? (1)

   c) Which is the noble gas? (1)

13. The molecular mass of glucose is 180.

   a) How will you prepare one molar solution of glucose? (1)

   b) How can you convert 1 molar solution into 0.5 molar solution? (1)

SET - A

SCORING KEY

Sl. No.	Value Points	Score	Total Score
1	a) Hydroxide of metals show basic nature b) Forms ionic compounds	1 1	2
2	a) 20g Hydrogen : 20 GAM = $20 \times 6.022 \times 10^{23}$ atoms b) 24g Carbon : 2 GAM = $2 \times 6.022 \times 10^{23}$ atoms	1 1	2
3	a) Ammonium chloride b) By combining ammonia and HCl formed, when ammonium chloride is heated. c) $NH_4Cl \rightleftharpoons NH_3 + HCl$ / $NH_4Cl \rightarrow NH_3 + HCl$ $NH_3 + HCl \rightarrow NH_4Cl$ **OR** a) When manganese dioxide is added. b) Catalyst c) Oxygen d) $2H_2O_2 \rightarrow 2H_2O + O_2$	1 1 1 1 1 1 1 1	4 4
4	a) 8 b) Q c) 16 d) $3s^2 3p^5$	1 1 1 1	4
5	a) 1 mol CO_2 2 mol H_2O b) 44g CO_2 = 1 mol 2 mol $CO_2 = 2 \times 44 = 88g$	2 2	4
6	a) Nature of reactants b) H_2 c) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ OR $Mg + 2HCl \rightarrow MgCl_2 + H_2$	1 1 1	3
7	a) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$ b) Metal c) 3d d) 4	1 1 1 1	4
8	a) $\frac{1}{12}C^{12} \times 4$ b) $\frac{1}{12}C^{12} \times 16$ or 16 times	1 1	2

Sl.No.	Value Points	Score	Total Score
9	a) Rate of reaction = $\frac{\text{amount of reactants consumed}}{\text{time}}$ = $\frac{5g}{2} = \frac{5}{2} g$ /minute b) Use HCl having more concentration. Calcium carbonate is added in powder form. Increase the temperature (Any two of the above)	2 2	4
10	's' subshell 1s < 2s < 2p < 3s < 3p < 4s < 3d < 4p	1 2	3
11	a) Mass of 10 mol water = 10×18g b) 10 mol CO_2 = 10×44g The order of increasing mass = 10 mol H_2O, 10 mol CO_2	1 1 1	3
12	a) A and B b) C c) D	1 1 1	3
13	a) One mol = 180g glucose 180 g of glucose is taken in a beaker and made upto 1 litre. b) Add more water to the solution upto 2 L.	 1 1	2
		40	**40**

B

FIRST TERMINAL EVALUATION 2016

CHEMISTRY

Standard : X **Score : 40**

Time : 1½ hour

Instructions

1. First 15 minutes is given as cool off time. This time is to be used for reading and understanding the questions.
2. Write down answers for all questions.
3. The score for each question is given along with the question.

1. When the element Fe with atomic number 26 undergo chemical reactions, ions with different oxidation states are formed.
   a. Write the sub shell electronic configuration of Fe^{3+}. (1)
   b. Write the formula of the compound formed between Fe^{3+} and chlorine. (1)
   c. Why does Fe show different oxidation states? (2)
2. Assume that 10 mol hydrogen and 10 mol oxygen react to produce water. Which reactant remains after the completion of the reaction? What is the quantity of the remaining reactant? (2)
3. To prepare hydrogen gas at a faster rate, magnesium powder was added to dilute hydrochloric acid instead of magnesium ribbon.
   a. Why does the rate of reaction increase, when magnesium powder is used instead of magnesium ribbon? (2)
   b. Write any instance from daily life in which the rate of chemical reaction can be increased in this manner. (1)
4. Select the correct statement.
   a. All shells have 'd' sub shells.
   b. 'P' sub shell can accommodate a maximum of 6 electrons
   c. The energy of shells decreases as the distance from the nucleus increases.
   d. Some of the f - block elements show radioactivity. (2)
5. Complete the table (Atomic mass : Na – 23, O – 16) (2)

Substance	Number of molecules	Number of atoms	Mass
Sodium	6.022×10^{23}	(a)	23g
Oxygen	(b)	$2 \times 6.022 \times 10^{23}$	(c) .....
Ozone	6.022×10^{23}	(d)	48g

6. Dilute sodium thiosulphate solution is taken in two test tubes. One test tube is heated. A few drops of dilute HCl are added in both the test tubes. A precipitate of sulphur is formed faster in the heated test tube.

   a. What will be the observation in the test tube that was not heated? (1)

   b. How does the temperature influence the rate of reaction? Explain. (2)

7. The sub shell electronic configuration of a few elements are given. (These are not actual symbols).

   A - $1s^2\ 2s^2\ 2p^5$

   B - $1s^2\ 2s^2\ 2p^6\ 3s^2$

   C - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^3\ 4s^2$

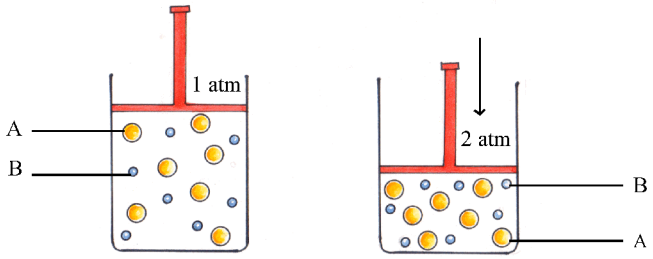
   D - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$

   a. Which of the elements belong to the same group? (1)

   b. Which of the elements belong to the same period? (1)

   c. Which of them are not representative elements? (1)

   d. Which is the non metal? (1)

8. 

   When a closed system containing gases A and B react together, how does the collision rate change on increasing the pressure? How does this influence the rate of reaction? Analyse the picture and find the answer. (3)

9. A) SO_2, NaOH

   If 100g each of the above substances are taken, which one will have greater number of atoms?

   (Atomic mass : S = 32, O = 16, Na = 23, H = 1) (4)

OR

   B) Consider 112 litre of SO_2 gas at STP.

   (Atomic mass : S = 32, O = 16, N = 14, H = 1)

   a) Calculate the GMM of SO_2. (2)

   b) Calculate the GMM for the same volume of NH_3 at STP. (2)

10. The atomic number of copper is 29. Its electronic configuration is given below. Identify the correct one. Give reason.

    a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^9\ 4s^2$

    b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$ (2)

11. $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ This is a reversible reaction.

a. Find out and write down the forward reaction and the backward reaction. (2)

b. When does this chemical reaction attain equilibrium? (1)

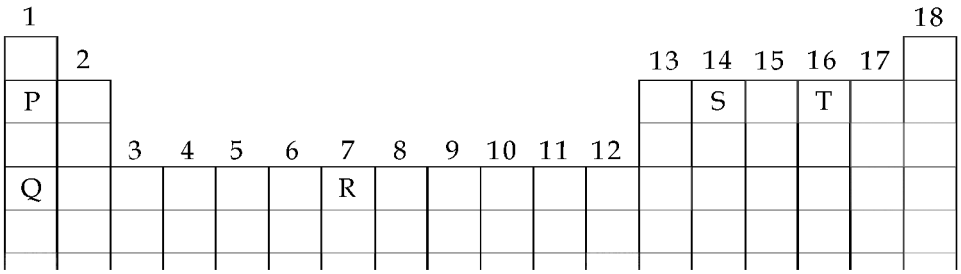
12. $H_2 + Cl_2 \rightarrow 2HCl$

Examine the above equation. Assume that in this reaction, 6.022×10^{23} Hydrogen molecules are taken.

a. How many molecules of chlorine will take part in the chemical reaction? (1)

b. How many moles of hydrogen chloride will be formed? (1)

13. An incomplete form of the periodic table is given. (These are not actual symbols).



a. Which is the largest atom? (1)

b. Which has the highest ionization energy? (1)

c. Which is the element whose electronic configuration ends as $2s^2\ 2p^2$? (1)

14. One litre of one molar sodium chloride (NaCl) solution is prepared in water.
(Atomic mass : Na = 23, Cl = 35.5)

a. How many grams of sodium chloride will be required? How is this solution prepared? (2)

b. How can you change the concentration of this solution to 0.5M? (1)

SET - B

SCORING KEY

Sl.No.	Value Points	Score	Total Score
1	a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5$ b) $FeCl_3$ c) • The energy of the 's' electrons of the outermost shell and 'd' electrons of the inner shell are same. • The electrons in the 's' subshell alone or the electrons in the 's' subshell and 'd' subshell together take part in chemical reaction.	1 1 1 1	4
2	Oxygen 5 mol Oxygen	1 1	2
3	a) When added in powder form, the surface area increases and number of molecules take part in the collision increases. b) Any suitable answer.	2 1	3
4	b) 'p' subshell can accommodate a maximum of 6 electrons. d) Some of the f-block elements show radio activity.	1 1	2
5	a) $1 \times 6.022 \times 10^{23}$ b) 6.022×10^{23} c) 32g d) $3 \times 6.022 \times 10^{23}$	½ ½ ½ ½	2
6	a) A white precipitate is formed slowly. b) When temperature increases, the kinetic energy of the molecules increases and rate of collision increases.	1 2	3
7	a) B and D b) C and D c) C d) A	1 1 1 1	4
8	Molecules come closer, as pressure increases. Volume decreases, number of collisions increases.	1 1+1	3

Sl.No.	Value Points	Score	Total Score
9	Molecular mass of SO_2 $= 32 + 2 \times 16 = 32 + 32 = 64$	½	
	Molecules in 100g SO_2: $\frac{100}{64} \times 6.022 \times 10^{23}$	½	
	Molecular mass of NaOH $= 23 + 16 + 1 = 40$	½	4
	Molecules in 100g NaOH: $\frac{100}{40} \times 6.022 \times 10^{23}$	½	
	100g of NaOH has larger number of molecules	1	
	$= \frac{100}{40} \times 6.022 \times 10^{23} > \frac{100}{64} \times 6.022 \times 10^{23}$	1	
	OR		
	a) Volume of any gas at STP - 1mol = 22.4 L	1	
	$\therefore$ 112 L = $\frac{112}{22.4}$ mol = 5 mol = 5GMM	1	
	b) 5 GMM	2	4
10	Correct answer is b.	1	
	The electronic configuration $3d^{10}4s^1$ with completely filled 'd' subshell has more stability.	1	2
11	a) Forward reaction - $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$	1	
	Backward reaction $2NH_{3(g)} \rightarrow N_{2(g)} + 3H_{2(g)}$	1	3
	b) When the rates of forward reaction and backward reaction become equal.	1	
12	a) 6.022×10^{23}	1	
	b) 2 mol / $2 \times 6.022 \times 10^{23}$	1	2
13	a) Q	1	
	b) T	1	3
	c) S	1	
14	a) • Molecular mass of NaCl = 23 + 35.5 = 58.5	1	
	• Requires 58.5g NaCl		
	• Take 58.5g NaCl in a beaker, and make up the solution to 1 Litre by adding water.	1	
	b) Add one more litre of water.	1	3
		40	**40**

C

FIRST TERMINAL EVALUATION 2016

CHEMISTRY

Standard : X **Score : 40**

Time : 1½ hour

Instructions

1. First 15 minutes is given as cool off time. This time is to be used for reading and understanding the questions.
2. Write down answers for all questions.
3. The score for each question is given along with the question.

1. From the statements given below, choose the correct statements regarding atoms. (2)

   a) There are four shells around the nucleus in all atoms.

   b) The 's' subshell is present in all shells.

   c) The third shell has 4 subshells.

   d) As the distance from the nucleus increases, the energy of the shells increases.

2. $H_2 + Cl_2 \rightarrow 2HCl$

   $2H_2 + O_2 \rightarrow 2H_2O$

   $3H_2 + N_2 \rightarrow 2NH_3$

   Examine the equations and write answers to the questions given below.

   a) How many molecules of hydrogen and chlorine are required to produce 4HCl molecules? (1)

   b) In what ratio should hydrogen and nitrogen react to get four molecules of ammonia? (1)

   c) If two molecules of hydrogen react with two molecules of oxygen, how many molecules of water will be obtained? (1)

3. Take magnesium ribbons of the same size in two test tubes. Add 1ml dilute HCl in one test tube and 1 ml concentrated HCl in the other.

   a) What will be the observation corresponding to the two reactions? (2)

   b) Give reason for these observations. (2)

4. A. MnO_2, $MnCl_2$ and Mn_2O_7 are compounds of Mn. (Atomic number of Mn is 25)

   a) Which property of Mn leads to the formation of these different compounds? Explain. (3)

   b) Find the oxidation number of Mn in MnO_2. (1)

   OR

   B. The subshell electronic configurations of a transition element is given below.

   $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^9\ 4s^2$

   $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$

   a) Which is the most accurate electronic configuration? Why? (2)

   b) What is the atomic number of this element? (1)

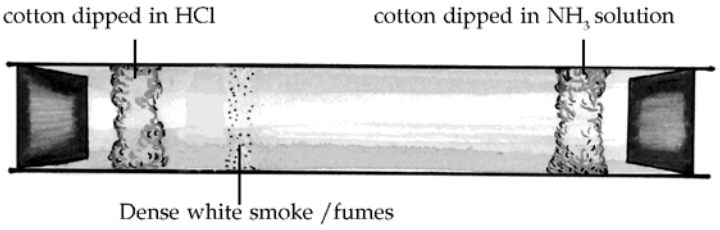
   c) To which period does this element belong? (1)

5. For 320 g of oxygen, find out the following. (Atomic mass of O = 16)

   a) Number of moles of atoms. (1)

   b) Number of moles of molecules. (1)

6.

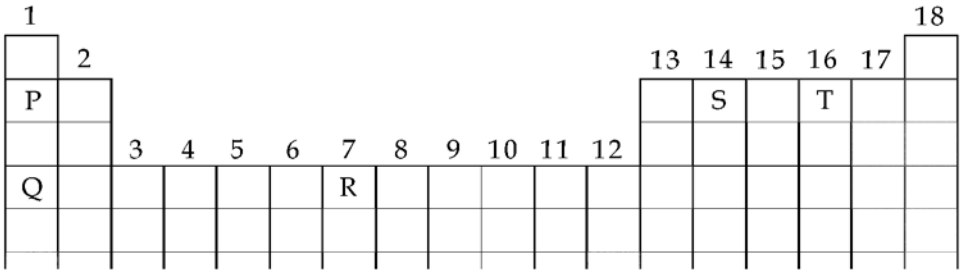


   a) Which substance is responsible for the dense white fumes? (1)

   b) What are the products obtained when this substance is heated? (1)

   c) Write equations for the reactions. (2)

7.



   A portion of the periodic table is given above. (Symbols are not real)

   a) Which of these are not representative elements? (1)

   b) Which element has electronic configuration $1s^2\ 2s^2\ 2p^4$? (1)

   c) Write the formula of the compound formed between P and T based on their valency. (2)

8. A glass is full of water. If the water has a mass of 180 g, calculate the following.

   a) Total number of molecules. (2)

   b) Total number of atoms. (1)

9. Match the following.

A	B	C
Decomposition of hydrogen peroxide	Vanadium pentoxide	Negative catalyst
Manufacture of sulphuric acid	Phosphoric acid	Positive catalyst

(2)

10. For an element in the second period, the last five electrons are filled in the p subshell. Find out the following.

    a) Subshell electronic configuration. (1)

    b) Group number (1)

    c) The block to which it belongs. (1)

11. Consider one mol CO_2 and 1 mol CH_4 at STP. Which among the following properties do they show similarities and differences. Substantiate your answer.

    (Atomic mass : C = 12, O = 16, H = 1)

    a) Volume

    b) Number of atoms

    c) Mass

    d) Number of molecules (4)

12. Find out the incorrect electronic configurations. (These are not actual symbols).

    A - $1s^2\,2s^2\,3s^2\,3p^1$

    B - $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^1\,4s^2$

    C - $1s^2\,2s^2\,2p^7$

    D - $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^1$ (2)

13. One litre of an aqueous solution containing 40 g of NaOH is prepared. (Atomic mass : Na = 23, O=16, H=1)

    a) What is the molarity of this solution? (2)

    b) If one litre of water is added to the above solution, what will be the molarity of the resultant solution? (1)

SET - C

SCORING KEY

Sl.No.	Value Points	Score	Total Score
1	b / 's' subshell is found in every shell. d / Energy increases as the distance from nucleus increases.	1 1	2
2	a) $2H_2 + 2Cl_2 \rightarrow 4\ HCl$ **OR** Two hydrogen molecules and two chlorine molecules b) 6 : 2 / 3:1 c) $2H_2 + O_2 \rightarrow 2H_2O$ two molecules of water obtained.	1 1 1	3
3	a) Dilute HCl reacts slowly. Conc. HCl reacts quickly. b) The number of molecules in a definite volume increases as concentration increases. Number of collisions increased as number of molecules increased.	 1 1 1 1	4
4	a) Mn has the ability to show variable oxidation states. Energy difference between outermost 's' subshell and inner 'd' subshell is very low. Take part in chemical reaction by losing electrons from these two. b) $Mn^x O^{-2}$ $x + (2 \times -2) = 0$ $x = +4$ **OR** a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$, The electronic configuration with completed 'd' subshell has more stability. b) 29 c) 4	1 2 1 1 1 1 1	4
5	a) No. of mole atoms = $\frac{\text{Mass in gram}}{\text{GAM}} = \frac{320}{16}$ b) No. of mole molecules = $\frac{\text{Mass in gram}}{\text{GMM}} = \frac{320}{32}$	1 1	2
6	a) Ammonium chloride (NH_4Cl) b) NH_3, HCl c) $NH_3 + HCl \rightarrow NH_4Cl$ $NH_4Cl \rightarrow NH_3 + HCl$ OR $NH_3 + HCl \rightleftharpoons NH_4Cl$	1 1 2	4

Sl.No.	Value Points	Score	Total Score
7	a) R b) T c) P_2T	1 1 2	4
8	a) Molecular mass of H_2O = 18 No. of moles = $\frac{180}{18}$ = 10 mol No. of molecules = $10 \times 6.022 \times 10^{23}$ Nos. b) 3 atoms in a molecule $\therefore$ Total atoms = $3 \times 10 \times 6.022 \times 10^{23}$	 2 1	3
9	a) H_2O_2 H_3PO_4 Negative catalyst b) H_2SO_4 V_2O_5 Positive catalyst	1 1	2
10	a) $1s^2\ 2s^2\ 2p^5$ b) Group number = 17 c) Block = p	1 1 1	3
11	a) Similarity - Volume, number of molecules b) Difference - mass, number of atoms	1+1 1+1	4
12	A $1s^2\ 2s^2\ 3s^2\ 3p^1$ C $1s^2\ 2s^2\ 2p^6\ 3s^1$	1 1	2
13	a) Molecular mass of NaOH = 23 + 16 + 1 = 40 1 mol NaOH = $\frac{40g}{40} = 1mol$ Molarity = $\frac{1mol}{1litre} = 1mol/l$ = 1M b) Molarity = $\frac{1mol}{2litre} = .5mol/l$ = 0.5M	 2 1	3
		40	**40**