

Sample Question Paper - 01
Chemistry
Std X

Chemistry Weightage to the Unit

No.	Name of Unit	Score	Percentage
1.	Language of chemistry	5	10%
2.	Gas Laws	5	10%
3.	Structure of Atom and Periodic Table	6	12%
4.	Electricity and Chemical reactions	5	10%
5.	Chemistry in daily life	4	8%
6.	Organic compounds - Naming and Isomerism	4	8%
7.	Organic compounds - Chemical reactions	4	8%
8.	Extraction of metals	6	12%
9.	Nitrogen and Phosphorous	6	12%
10.	Acids	5	10%
	Total	50	100%

Weightage to type of questions

Objective type		Short Answer type		Essay	
Score	Percentage	Score	Percentage	Score	Percentage
15 $\frac{1}{2}$ %	31%	25%	50%	9 $\frac{1}{2}$	19%

Blue Print Chemistry

Unit / Co	Type of Questions				Total Score
	Objective	Short Answer	Essay	Others	
1	1	4			5
2	1½	3½			5
3	2	1½	2½		6
4	1½	3½			5
5			4		4
6	2	2			4
7	2	2			4
8	2	1	3		6
9	1	5			6
10	2½	2½			5
Total	15½	25	9½		50

Curriculum Objectives

1. Develops ability to derive formula of compounds from valency of component elements.
2. Is able to calculate the percentage composition of compounds.
3. Is able to explain the relation between volume and pressure of a gas based on Boyle's law.
4. Establishes the relation between gram atom, gram mole and molar volume.
5. Understands the relation between electronic configuration and periodic table.
6. Understands the relation between ionisation energy and periodic table.
7. Develops the concept of an electrochemical cell (galvanic cell), cathode, anode and cell emf.
8. Assimilates the process involved in electrolysis.
9. Understand the effect of the use of fertilizers in cultivation and explain its effect on the nature of the soil.
10. Understands the IUPAC system of nomenclature of organic compounds.
11. Is able to explain isomerism, identifies and detects various type of isomers.
12. Understands the various type of chemical reactions of hydrocarbons.
13. Develops the concept of minerals, ores and various process adopted for extracting metals.
14. Understands the familiar compounds of metals and their salient characteristics and uses.
15. Develops the concept of reversible reactions and the conditions for the completion of reversible reactions.
16. Is able to understand and explain Lewis acid and Lewis base.
17. Understand and apply pH value to classify the substances in to acidic, alkaline and neutral.
18. Realises the oxidising power of sulphuric acid.

Chemistry

Std X

Score : 50

Time : 1½ hours

1. The pressure and volume of a gas is P_1 and V_1 respectively. When pressure becomes P_2 if volume is V_2
- State the condition for $P_1V_1 = K$? ½
 - Choose the correct equation to calculate V_2 ?

$$\left[\frac{P_1V_1}{P_2}, \frac{P_1P_2}{V_1}, \frac{P_2V_1}{P_1} \right]$$

1 ½

2. The valency of certain radicals are given below

Name of the radical	Symbol	Valency
Sulphate ion	SO_4^{2-}	2
Nitrate ion	NO_3^{1-}	1
Phosphate ion	PO_4^{3-}	3

If the chemical formula of aluminium sulphate $Al_2(SO_4)_3$

- What is the valency of aluminium ? (1)
- Write the names and chemical formula of the compounds formed when aluminium combines with nitrate and phosphate radicals ? (2)
- The molecular formula of $Al_2(SO_4)_3$ is 342 and atomic mass of sulphur is 32. Calculate the percentage composition of sulphur in $Al_2(SO_4)_3$? (2)

OR

The valencies of some radicals are given below

Radial	Calcium (Ca)	Sodium (Na)	Magnesium (Mg)	Aluminium (Al)	Carbonate (CO_3^{2-})	Chloride (Cl^-)
Valency	2	1	2	3	2	1

- Choose the correct chemical formula from the following ?
 $[Ca(CO_3)_2, MgCO_3, NaCO_3, Na_2Cl]$ (1)
- Write the chemical formulae of two compounds in which the number of component radicals is one each ? (2)
- Calculate the percentage composition of nitrogen in $Ca(NO_3)_2$? (2)

Hint : The molecular mass of calcium nitrate is 164 and atomic mass of nitrogen is 14.

3. The structural formulae of three organic compounds are given below. Based on this answer the following questions.

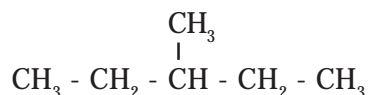
- $CH_3 - O - CH_2 - CH_2 - CH_3$
- $CH_3 - CH_2 - O - CH_2 - CH_3$
- $CH_3 - CH_2 - \underset{\substack{| \\ OH}}{CH} - CH_3$

The chemical formula of these compounds is $C_4H_{10}O$

- Identifies the functional groups of these compounds ? (1)
- Write the IUPAC name of the last compound ? (1)
- Find the pair of functional isomers from the given compounds. Write the reasons for selecting the pair ? (2)

OR

The structural formula of an organic compound is



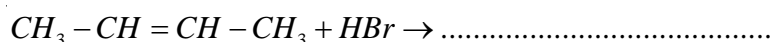
- Find out the number of carbon atoms in the longest carbon chain ? (½)
- Write the IUPAC name of this compound ? (1)
- Write the formula of this compound, Identify the type of isomerism ? (2½)

4. Analyse the table and fill up the blanks in the table

Gas	Molar Volume	Given Volume	Number of Moles	Mass of gas
H_2	22.4 litre	44.8 litre	2 mole	4 g
O_2	22.4 litre	224 litre	-----	320 g
N_2	22.4 litre	44.8 litre	2 mole	-----
Cl_2	22.4 litre	22.4 litre	-----	-----

Hints : The atomic masses of the elements in the table are hydrogen-1, oxygen - 16, nitrogen -14, chlorine - 35.5 (3)

5. The chemical reaction in which an organic compound involved is represented as follows.



based on this answer the following questions

- State whether the organic compound is an alkene or not ? (½)
- Write the structural formula of the product obtained from the reaction ? (2)
- Identify the type of reaction ? Explain ? (1½)

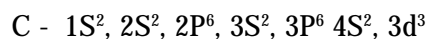
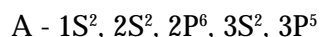
6. The P^H values of certain familiar substances are given below.

Substance	pH value
Blood	7.4
Milk	6.8
Water	7
Saliva	6.4

Analyse the data in the table and answer the following questions

- Which of the substances are acidic in nature ? (1)
- Which substance is basic in nature ? (1)

7. The electronic configuration of three elements and some hints are given below. Examine them and answer the following questions.



(The symbols given are not real)

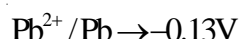
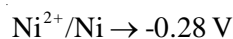
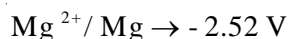
Hints : -

- The element which forms coloured compounds.
- Show variable oxidation states.

Questions

- a) Write the atomic number of any one of the element ? (1/2)
- b) Identify the blocks in the periodic table in which the elements A,B,C are located ? (1/2)
- c) Which is the element appropriate to the hints ? (1)
- d) Which is the element located to the left side of the periodic table ? Give reasons ? (1 1/2)
- e) Which element has the highest ionization energy ? why ? (2 1/2)

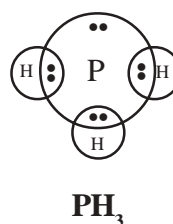
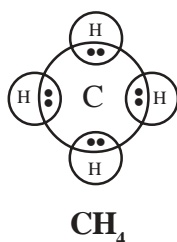
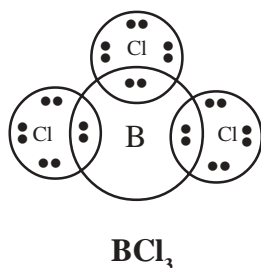
8. The electrode potentials of three metals are given below ?



Answer the following questions

- a) Find out the metal which acts as anode only ? (1/2)
- b) Which are the anode and cathode in the cells formed by above metals ? (1)
- c) Identify the pairs of electrodes which give the highest and lowest emf ? (1 1/2)

9. The diagrammatic representation of the chemical bonds in certain compounds are given below.



- a) Which are the compounds that does not have a lone pair of electron ? (1/2)
- b) Find out the Lewis acid and Lewis base from the diagrams ? (1)
- c) Write down the chemical formula of the compound formed by the reaction between Lewis acid and Lewis base ? (1 1/2)

10. The chemical equation given below represents the reaction between hydrogen iodide and concentrated sulphuric acid



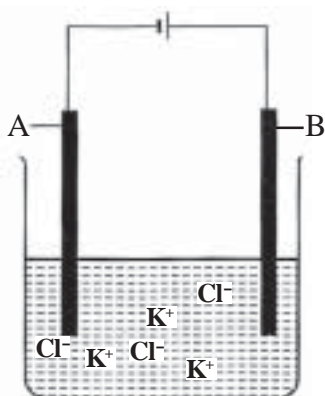
- a) Which are the products in the reaction ? (1/2)
 b) Find out the oxidation states of I₂ and S in H₂S? (1)
 c) In the above reaction which substance is oxidized ? why ? (1 1/2)

Hints :

The oxidation state of sulphur in H₂SO₄ is +6

The oxidation state of iodine in HI is -1

11. The diagram shows the arrangements of the electrolysis of molten potassium chloride

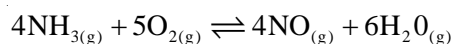


- a) Which are the anode and cathode in the above diagram ? (1/2)
 b) Which ion is oxidised ? (1/2)
 c) Write the equation of the reaction taking place at the anode ? (1)
12. The uses of two compounds are given below. Write down the characteristics of the compounds based on their uses ?

Compound	Uses
Calcium oxide (CaO)	To remove gangue during the extraction of metals, as drying agent
Plaster of Paris [(CaSO ₄) ₂ H ₂ O]	To make bandage and statues

(2)

13. The chemical equation given below represents the reaction involved in the preparation of nitric oxide from ammonia.



Answer the following questions

- a) What is the physical state of reactants and products ? (1/2)
 b) If more oxygen is added to the system what change takes place in the reaction ?
 What is the advantages of this change ? (1)
 c) If pressure is reduced the rate of the reaction in which direction is accelerated ? Why ? (1 1/2)

14. The following table represents the reactivity of metals in the electrochemical series in the descending order

K	Ca	Na	Mg	Al	Zn	Fe	Ni	Sn	Pb	H	Cu	Hg	Ag	Au
---	----	----	----	----	----	----	----	----	----	---	----	----	----	----

The ores of some metals in the table are given below

1. Bauxite - $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$
2. Galena - PbS
3. Rock salt - NaCl

- a) Which is the most stable ore ? (1)
- b) What are the methods of extraction of the metal from their respective ores ? why ? (3)

Hints :

Methods of extraction of metals

- Reduction with carbon
- Electrolysis
- Reduction with aluminium

15. A farmer purchased a new farm. He discussed with an agriculture officer and other farmers about the scientific use of fertilizers so as to make cultivation profitable and retain the fertility of the land. The details thus collected are listed below.

Due to the uses of fertilizers

- assures the availability of food materials / crops
- helps to retain the attitude towards cultivation
- makes cultivation profitable
- to attain higher yield from lesser area
- to vitalize the growth of plants
- continuous use of fertilizers decreases the fertility of the soil
- leads to destruction of micro organisms beneficial to plants
- reduces the natural immunity of plants
- increases the attack of pests and insects

Analyzing the data provided what are the instructions that you can give the farmer regarding the advantages and disadvantages of using fertilizers or not using fertilizers. (4)

Scoring Indicators

No.	Scoring Indicators	Score	Total Score	Time
1.	a Writes temperature is constant b Writes the correct equation based on $P_1V_1=P_2V_2$	$\frac{1}{2}$ $1\frac{1}{2}$	2	3 min
2.	a Writes the valency of Al is 3 b • Writes correct formula Partial Scores • Correct symbols / Correct valencies (1) c • Calculate the percentage composition correctly with proper steps (2) (Full credit should be given if the steps are correct and final answer alone is wrong) • Writes the methods of calculating percentage composition (1) OR a Chooses the correct formula b • Writes two compounds in which the number of component radicals is one each (2) • has identify one compound (1) • Writes the formula so that the valencies are equal Eg : $Ca_2(CO_3)_2, Mg_2(CO_3)_2...$ (1) c Finds the percentage composition of nitrogen	1 2 2 1 2 2	5	8 min
3.	a • Writes two functional groups (1) • Writes one functional group ($\frac{1}{2}$) b • Writes IUPAC name correctly (1) • Word root is correct / name the compound according to functional group/ identify the position of functional group correctly ($\frac{1}{2}$) c • Identifies appropriate functional groups and state reason (2) • Identifies appropriate functional group (1) OR (same as above)	1 1 2	4	6 min
4.	• Fill up the fourth column correctly • Fill up the fifth column correctly (give proportionate credit to partially correct answer)	$\frac{1}{2} + \frac{1}{2}$ 1 + 1	3	5 min
5.	a Writes the statement is true b • Writes the structural formula correctly (Position of H and Br, change in the chemical band) • Writes H and Br are in appropriate positions with wrong representation of bond /incorrect position of H and Br but breaking of double bonds specified (1) c Writes type of reaction correctly with reason ($1\frac{1}{2}$) addition reaction ($\frac{1}{2}$) reason (1)	$\frac{1}{2}$ 2 $1\frac{1}{2}$	4	5 min
6.	a Has identified and written acidic substances from the list b Has identified and written alkaline substance from the list	1 1	2	3 min
7.	a Writes atomic number of any one element correctly according to the number of electrons b Has written the correct block c Based on hints locate the d block elements	$\frac{1}{2}$ $\frac{1}{2}$ 1		

No.	Scoring Indicators	Score	Total Score	Time
d	Identifies the element after locating the block	1½		
e	Writes the element, specifies relation between atomic size and ionisation energy and periodic table	2½	6	8 min
8. a	Identifies anode and cathode correctly	½		
b	Compares the electrode potential of a pair and defects the cathode and anode in each case	1		
c	<ul style="list-style-type: none"> Calculates and find out the pairs giving maximum emf and minimum emf(1½) Identifies any one of the above (1) 	1½	3	6 min
9. a	Defects the compounds which do not have lone pair of electron	½		
b	Identifies the electron donor and acceptor and writes the Lewis acid and Lewis base correctly	1		
c	Writes chemical formula of compound / gives diagramatic representation specifying the sharing of electrons correctly	1½	3	6 min
10. a	detects and writes the products	½		
b	<ul style="list-style-type: none"> Writes oxidation state of I₂ and S in H₂S(1) Writes oxidation state of any one (½) 	1		
c	<ul style="list-style-type: none"> Writes that HI is oxidised and explain the reason based on oxidation state(1 ½) Identifies the substance (½) 	1½	3	7 min
11. a	Identifies anode and cathode correctly	½		
b	Writes the ion oxidised (½)	½	2	4 min
c	Writes the chemical reaction taking place in electrode specifically (1)	1		
12.	<ul style="list-style-type: none"> CaO acts as a flux (1) Plaster of paris absorbs water and solidifying in specific time (1) 	2	2	4min
13. a	Defects the state of products and reactants as gas	½		
b	<ul style="list-style-type: none"> accelerates forward reaction (1) Increases quantity of products (½) 	1		
c	<ul style="list-style-type: none"> Explains the phenomenon based on pressure volume relation in a system at equilibrium (1 ½) reducing pressure accelerate forward reaction (1) 	1½		7 min
14. a	Identifies the most stable compound (1)	1		
b	<ul style="list-style-type: none"> Writes the process adopted in the extraction of all three metals and explains why the process is adopted (3) Writes the process adopted in the extraction of any one (1) Identifies process and not write reason (1) 	3	4	8 min
15.	<p>Analysing the given data arrives at and writes the following similar or other conclusions</p> <ul style="list-style-type: none"> Fertilizers may be used to get better yield Regular soil testing and adopting remedial measures Using fertilizers along with biomanures instead of using fertilizers alone Using fertilizers and manure based on the nature of crop and soil Seeking advice of experienced farmers and agricultural officers Avoid use of fertilizers in naturally fertile soil Four or more (4) <p>Below four for each statement (1)</p>	4	4	10 min

Questionwise Analysis

Q. No	CO / Unit	Mental process	Type of Questions			Score	Time
			Objective	Short Answer	Essay		
1	3 (2)	1,2,7	½	1½		2	3 min
2	1,2 (1)	1,2,4,7 or 1,3,4,7	1	4		5	8 min
3	10,11 (6)	1,2,5	2	2		4	6 min
4	4 (2)	1,4,7	1	2		3	5 min
5	12 (7)	1,5,7	2	2		4	5 min
6	17 (10)	1,4	2			2	3 min
7	5,6 (3)	1,2,5,7	2	1½	2½	6	8 min
8	7 (4)	1,3,4,9	½	2½		3	6 min
9	16 (9)	1,3,4,7	½	2½		3	6 min
10	18 (10)	1,5,7,9	½	2½		3	7 min
11	8 (4)	1,2	1	1		2	4 min
12	14 (8)	1,2,7	1	1		2	4 min
13	15 (9)	1,5,7	½	2½		3	7 min
14	13 (8)	1,4,7	1		3	4	8 min
15	9 (5)	1,2,4,7,9,10			4	4	10 min