DIET ALAPPUZHA

നിറകതിർ 2022

SSLC പഠന സഹായി

CHEMISTRY

ENGLISH MEDIUM

ആമുഖം

കോവിഡ് സൃഷ്ടിച്ച പ്രതിസന്ധികൾക്കിടയിലും ആലപ്പുഴ റവന്യൂ ജില്ലയിലെ പൊതു വിദ്യാലയങ്ങൾ തങ്ങളുടെ അക്കാദമികവും സാമൂഹ്യവുമായ ഉത്തരവാദിത്വങ്ങൾ വിജയകരമായി നിർവ്വഹിച്ചു വരികയാണല്ലോ? ജില്ലയിലെ പൊതു സമൂഹവും, തദ്ദേശ സ്വയംഭരണ സ്ഥാപനങ്ങളും, ജനപ്രതിനിധികളും, വിദ്യാഭ്യാസ വകുപ്പിന്റെ വ്യത്യസ്ത ഏജൻസികളും, വിദ്യാലയങ്ങൾക്കൊപ്പമുണ്ട്.

ജില്ലയിലെ പത്താംതരം വിദ്യാർത്ഥികളുടെ പൊതു പരീക്ഷാ തയ്യാറെടുപ്പിനെ സഹായിക്കുന്ന ഒരു വായനാ സാമഗ്രിയുടെ ആവശ്യകത ഇക്കൊല്ലവും പരക്കെ ഉന്നയിക്കപ്പെടുകയുണ്ടായി.ഇതിന്റെ അടിസ്ഥാനത്തിലാണ് *നിറകതിർ 2022* ഡയറ്റ് തയ്യാറാക്കുന്നത്. കേരള പൊതുവിദ്യാഭ്യാസ വകുപ്പ് എസ്.എസ്.എൽ.സി പരീക്ഷയുമായി ബന്ധപ്പെട്ട് നൽകിയിട്ടുള്ള മാർഗ്ഗ നിർദ്ദേശങ്ങളെ ഉൾക്കൊണ്ടാണ് ഇതിലെ ഉള്ളടക്കം തയ്യാറാക്കിയിട്ടുള്ളത്.

വളരെ കുറഞ്ഞ സമയത്തിനുള്ളിൽ തന്നെ എല്ലാ വിഷയങ്ങളിലും വായനാ സാമഗ്രി തയ്യാറാക്കാൻ കഴിഞ്ഞത് ജില്ലയിലെ അദ്ധ്യാപകരുടെ ആത്മാർത്ഥ പരിശ്രമം കൊണ്ടുമാത്രമാണ്. മികച്ച ആത്മവിശ്വാസത്തോടെ എസ്.എസ്.എൽ.സി. പരീക്ഷയെ അഭിമുഖീകരിക്കാൻ "നിറകതിർ 2022" സഹായിക്കുമെന്ന് പ്രതീക്ഷിക്കുന്നു.

ഈ സംരംഭത്തെ സഹായിച്ച എല്ലാവർക്കും നന്ദി.

ഡോ. കെ.ജെ. ബിന്ദു
പ്രിൻസിപ്പൽ ഇൻ ചാർജ്
ഡയറ്റ് ആലപ്പുഴ

എം. അജയകുമാർ
സീനിയർ ലക്ചർ, ഫാക്കൽറ്റി ഓഫ്
ഐ.എഫ്.ഐ.സി
ഡയറ്റ് ആലപ്പുഴ

തീയതി: 15/02/2022.

തയ്യറാക്കിയവർ

1. എസ്. ജയകുമാർ.
   എച്ച്. എസ്. റ്റി
   സി.ബി.എം. എച്ച്. എസ്, നൂറനാട്
2. ആർ. രാജേഷ്
   എച്ച്. എസ്. റ്റി
   സി.ബി.എം. എച്ച്. എസ്, നൂറനാട്
3. ഷിബു. കെ. എ
   എച്ച്. എസ്. റ്റി.
   ജി. വി. എച്ച്. എസ്.എസ്. ചുനക്കര

രസതന്ത്രം

യൂണിറ്റ് 1. പീരിയോഡിക് ടേബിളും ഇലക്ട്രോൺ വിന്യാസവും

- ഷെല്ലുകളും സബ്ഷെല്ലുകളും.
- സബ്ഷെല്ലിലെ ഇലക്ട്രോണുകളുടെ എണ്ണം.
- സബ്ഷെല്ലിലെ ഇലക്ട്രോൺ പൂരണം.
- സബ്ഷെൽ ഇലക്ട്രോൺ വിന്യാസവും ബ്ലോക്കും.
- സബ്ഷെൽ ഇലക്ട്രോൺ വിന്യാസത്തിന്റെ അടിസ്ഥാനത്തിൽ പീരിയഡ്, ഗ്രൂപ്പ് എന്നിവ കണ്ടെത്താം.
- s ബ്ലോക്ക് മൂലകങ്ങളുടെ ഗ്രൂപ്പ് നമ്പർ.
- p ബ്ലോക്ക് മൂലകങ്ങൾ.
- d ബ്ലോക്ക് മൂലകങ്ങൾ.
- d ബ്ലോക്ക് മൂലകങ്ങളുടെ ചില പ്രത്യേകതകൾ.

യൂണിറ്റ് 2. വാതകനിയമങ്ങളും മോൾ സങ്കല്പനവും

- വാതകത്തിന്റെ വ്യാപ്തം.
- വാതകത്തിന്റെ മർദം.
- താപനില.
- വ്യാപ്തവും മർദവും.
- വ്യാപ്തവും താപനിലയും.
- വ്യാപ്തവും തന്മാത്രകളുടെ എണ്ണവും.
- ഗ്രാം അറ്റോമിക മാസ്.
- ഒരു മോൾ ആറ്റങ്ങൾ.
- മോളിക്യുലാർ മാസും ഗ്രാം മോളിക്യുലാർ മാസും.
- തന്മാത്രകളുടെ എണ്ണം
- ഒരു മോൾ തന്മാത്രകൾ

യൂണിറ്റ് 3. ക്രിയാശീല ശ്രേണിയും വൈദ്യുത രസതന്ത്രവും

- ജലവുമായുള്ള ലോഹങ്ങളുടെ പ്രവർത്തനം.
- ലോഹങ്ങളുടെ വായുവുമായുള്ള പ്രവർത്തനം.
- ആസിഡുമായുള്ള ലോഹങ്ങളുടെ പ്രവർത്തനം.
- ക്രിയാശീല ശ്രേണിയും ആദേശ രാസപ്രവർത്തനവും.
- ഗാൽവനിക് സെൽ.

യൂണിറ്റ് 4. ലോഹനിർമ്മാണം

- ധാതുക്കളും അയിരുകളും.
- അയിരുകളുടെ സാന്ദ്രണം.
- സാന്ദ്രീകരിച്ച അയിരിൽ നിന്നും ലോഹത്തെ വേർതിരിക്കൽ.
- ലോഹശുദ്ധീകരണം.
- ഇരുമ്പിന്റെ വ്യാവസായിക നിർമ്മാണം.
- വിവിധതരം അലോയ് സ്റ്റീലുകൾ.

യൂണിറ്റ് 5. അലോഹ സംയുക്തങ്ങൾ

- അമോണിയ.
- ഉഭയദിശാപ്രവർത്തനങ്ങളും ഏകദിശാപ്രവർത്തനങ്ങളും.
- രാസസംതുലനം.
- ലേ-ഷാറ്റ്ലിയർ തത്ത്വം.
- സംതുലനാവസ്ഥയിൽ ഗാഢതയുടെ സ്വാധീനം.
- സംതുലനാവസ്ഥയും മർദവും.
- സംതുലനാവസ്ഥയും താപനിലയും.
- സംതുലനാവസ്ഥയും ഉൽപ്രേരകവും.

യൂണിറ്റ് 6. ഓർഗാനിക് സംയുക്തങ്ങളുടെ നാമകരണവും ഐസോമറിസവും

- ആൽക്കെയ്ൻ,ആൽക്കിൻ,ആൽക്കൈൻ
- ഹോമലോഗസ് സീരീസ്.
- ശാഖകളില്ലാത്ത ആൽക്കെയ്നുകളുടെ നാമകരണം.
- ശാഖകളുള്ള ഹൈഡ്രോകാർബണുകളുടെ നാമകരണം.
- ഒന്നിലധികം ശാഖകൾ അടങ്ങിയ ഹൈഡ്രോകാർബണുകളുടെ നാമകരണം.
- അപൂരിത ഹൈഡ്രോകാർബണുകളുടെ നാമകരണം.
- ഫങ്ഷണൽ ഗ്രൂപ്പുകൾ- ഹൈഡ്രോക്സിൽ ഗ്രൂപ്പ്, കാർബോക്സിലിക് ഗ്രൂപ്പ്, ഹാലോ ഗ്രൂപ്പ്, ആൽക്കോക്സി ഗ്രൂപ്പ്

യൂണിറ്റ് 7. ഓർഗാനിക് സംയുക്തങ്ങളുടെ രാസപ്രവർത്തനങ്ങൾ

- ആദേശ രാസപ്രവർത്തനങ്ങൾ.
- അഡീഷൻ രാസപ്രവർത്തനങ്ങൾ.
- പോളിമൈറൈസേഷൻ.
- ഹൈഡ്രോകാർബണുകളുടെ ജ്വലനം.
- താപീയ വിഘടനം.

CONTENTS

1 Periodic Table and Electronic Configuration

To Remember

-

Shell	Number of subshells	Subshells
K(1)	1	s
L(2)	2	s , p
M(3)	3	s , p , d
N(4)	4	s , p , d , f

-

Subshell	Maximum number of electrons that can be accommodated
s	2
p	6
d	10
f	14

- The subshells in the increasing order of their energies.
  1s < 2s < 2p < 3s < 3p < 4s < 3d ....
-
  Block = The subshell to which the last electron is added.
-
  Period number = Serial number of the outer most shell
-

Block	Group number
s	**Number of electrons in the last 's' subshell** Eg : $_{11}$ Na - $1s^2\ 2s^2\ 2p^6\ 3s^1$ **Group number = 1**
p	**Number of electrons in the last 'p' subshell + 12** Eg: $_{15}$P - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$ **Group number = 12 + 3 = 15**

d	**Number of electrons in the outer most 's' subshell + number of electrons in the proceeding 'd' subshell** Eg : $_{23}$ V - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^3\ 4s^2$. **Group number = 2 + 3 = 5**

■

Block	Position
s	**Group 1 and group 2**
p	**Group 13 to 18**
d	**Group 3 to 12**

NON FOCUS AREA

■ Electronic configuration of Chromium and copper

$_{24}$ Cr - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^1$

$_{29}$ Cu - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$

Characteristics of s, p and f block elements

S block	P block	f block
• More metallic character • Less ionisation energy • Less electronegativity	• Contains metals non metal and metalloids. • Solid, liquid and gaseous elements are present • high electronegativity and high ionisation energy compared to s block elements	• most of these show variable oxidation states • Most of the actinoids are radioactive and are artificial elements. • The last electrons in these elements are filled up in the ante penultimate shell.

Each question from 1 to 9 carries 1 score.

1. Which one of the following subshells is not possible in an atom ?
   (1s, 2p, 5s, 2d)
2. What is the maximum number of electrons that can be accommodated in d subshell?
3. Which shell has only one subshell?
4. Which subshell among the following has the highest energy?
   (2p,4s,3d,3p)
5. How many subshells are present in M shell?

6. In which block does the transition elements belong?

7. Subshell electronic configuration of an atom is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$. How many shells are present in this atom?

8. What is the oxidation state of Mn in Mn_2O_3.
   (Hint: oxidation state of Oxygen is (-2))
   [+4, +3, +2, +1]

9. Choose the wrong subshell electronic configuration from those given below.
   ($1s^2\ 2s^1$, $1s^2\ 2s^2\ 2p^4$, $1s^2\ 2s^2$, $1s^2\ 2s^2\ 2p^7$)

Each question from 10 to 14 carries 2 scores.

10. Subshell electronic configuration of an element is [Ar] $4s^1$.
    a) Write the complete subshell electronic configuration of this element.
    b) What is the atomic number of the element.

11. a) Find the oxidation state of Fe in $FeCl_2$.
    [Hint: Atomic number of Fe = 26, Oxidation state of Cl = -1]
    b) Write down the subshell electronic configuration of Fe^{3+}.

12. Find out the correct statements related to d block elements among the given statements below.
    a) Shows variable oxidation state.
    b) They are non - metals.
    c) They produce coloured compounds.
    d) They show high electronegativity.

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

    P- $1s^2\ 2s^2\ 2p^3$
    Q- [Ar] $3d^3\ 4s^2$
    R- $1s^2\ 2s^2\ 2p^6$
    S- $1s^2\ 2s^2\ 2p^6\ 3s^1$

    a) Which element among these can form coloured compounds?
    b) Which are the elements belong to the same block?

14. Subshell electronic configuration of an element is [Ar] $3d^5\ 4s^1$.
    a) What is the atomic number of the element ?
    b) Which is the subshell to which the last electron is added?

Each question from 15 to 17 carries 3 scores.

15. The element X has 1 electron in the s subshell in 3rd shell.
    a) write the complete subshell electronic configuration of X.
    b) Find out the atomic number of this element.
    c) To which block does the element X belong?

16. a) Find out the oxidation state of Mn in the following compounds.
    i) $MnCl_2$ ii) MnO_2
    [Hint :Oxidation state Cl = (-1) , O =(-2)]
    b) Give reason for the variable oxidation state of d block elements.

17. The atomic number of an element is 19.
    a) Write the subshell electronic configuration of this element.
    b) Find out the period number and group number of the element.

Each question from 18 to 20 carries 4 scores.

18. a) Select the correct subshell electronic configuration of $_{24}$Cr from the following:
    i) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^4\ 4s^2$
    ii) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^1$
    b) Write the reason for selecting this configuration.
    c) Find out the period number and group number of the element.

19. Analyse the table and answer the questions. (The symbols are not real)

Element	Period number	Group number
X	3	17
Y	2	2

    a) Write the subshell electronic concentration of element Xand Y
    b) To which block of the periodic table does the element Y belong?
    c) How many p electrons are in the element X.

20. Subshell electronic configuration of some elements are given below.
    (Symbols are not real)
    X - [Ne] $3s^2$
    Y - [Ar] $4s^2$
    Z - [Ar] $3d^3\ 4s^2$
    a) Write the complete subshell electronic configuration of element Y.
    b) Which of them shows variable oxidation state?
    c) Find the group number and period number of element Z.

NON FOCUS AREA QUESTIONS

1. Which of the following is the correct sub shell electron configuration of Cr 1 Mark

    a. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^4\ 4s^2$
    b. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^1$
    c. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5\ 3d^5\ 4s^2$
    d. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5\ 3d^5\ 4s^2$

2. To which block of the periodic table does actinoids belong? 1 Mark

3. Find the false statements from the following and correct them. 2 Mark
    a) s block elements shows positive oxidation state.
    b) s – block elements shows high ionisation energy.
    c) s-block elements belong to group 1 and 2 of periodic table.

2 Gas Laws and Mole Concept

To Remember

- Boyle's law – volume (V) inversely proportional to pressure(P)
  PV = a constant.
- Charles law – volume (V) directly proportional to Temperature in Kelvin scale (T)
  $\frac{V}{T}$ = a constant.
- Avogadro's law- volume (V) directly proportional to number of molecules(n)
- No. of mole atom / No.of GAM = Mass in grams / GAM of the element
- No. of atoms = No. of mole atom / (No.of GAM) x 6.022×10^{23}
- Mass in grams(In case of atoms) = No. of mole atom / No.of GAM x 1GAM
- The number 6.022×10^{23} is known as Avagadro number.
- 1 GAM = 1 Mole atom = 6.022×10^{23} atoms
- No.of GMM / No. of moles = Mass in grams / GMM
- No. of molecules = No. of GMM(No. of moles) x 6.022×10^{23}
- Mass in grams(In case of molecules) = No.of GMM(No. of moles) x 1GMM
- 1 GMM = 1 Mole molecules(Mole) = 6.022×10^{23} molecules

NON FOCUS AREA

- Volume of 1 mole gas at STP= 22.4 L = 1 GMM = 6.022×10^{23} molecules
- No of moles of gas at STP = $\frac{Given\ volume\ 'in\ Litre}{22.4\,L}$
- Volume = No of moles x 22.4 L

Each question from 1 to 9 carries 1 score.

1. The relation between volume of a definite mass of a gas and pressure at a constant temperature is known as .....
   [Charles' law, Avogadro's law, Boyle's law, Le-chatelier's Principle]

2. Analyse the situations given below and write the one which is related to Charles' law.
   a)If an inflated balloon is kept in sunlight, it will burst after sometime.
   b) As the balloon is being inflated,its volume increases.
   c) The size of air bubbles rising from the bottom of a water body gradually increases
3. Find the relation and fill in the blank
   16g Oxygen = 1 GAM
   16g Helium = ... GAM
   [Hint : Atomic mass O = 16 ,He = 4]
4. What is the mass of 1GMM CO_2?
   [Hint : molecular mass CO_2 = 44]
5. How many GAM is present in 56g nitrogen?
   [Hint : Atomic mass N = 14]
6. How many GMM are there in 48g CH_4?
   [Hint : Molecular mass CH_4 = 16]

Each question from 7 to 11 carries 2 scores.

7. Examine the data given in the table.
   (Temperature and number of molecules of the gas are kept constant)

Pressure (P)	Volume (V)
1 atm	8 L
2 atm	4 L
4 atm	2 L

   a) What will be the volume of this gas at 8 atm pressure?
   b) Which is the gas law related to this ?
8. What happens to the size of a gas bubble rising from the bottom of a water body? why?
9. a) The volume of a fixed mass of gas at 300K is 10L.What will be the volume of the gas,if the temperature is doubled without changing the pressure.
   b) Which is the gas law related to this?
10. The molecular mass of CO_2 is 44.
    a)Find the mass of 1GMM CO_2.
    b) How many moles of molecules are there in 220 g of CO_2?
11. Atomic mass of nitrogen is 14.
    a) How many atoms are present in 1 GAM nitrogen.
    b) Find the mass of $4 \times 6.022 \times 10^{23}$ nitrogen atoms.

Each question from 12 to 14 carries 3 scores.

12. The data of an experiment conducted on a fixed mass of gas at constant pressure are given.

Volume(V) L	Temperature(T)K
600	300
800	(X)
(Y)	450

    a) Find the values of (X) and (Y)
    b) What is the relation between volume and temperature at constant pressure ?

13. Complete the table

Element	Mass in grams	Number of GAM	Number of atoms
Helium	20g	.....(a).....	.....(b).....
Chlorine	.....(c).....	4	4 x 6.022x10^{23}

(Hint : Atomic mass He = 4 , Cl = 35.5)

14. The molecular mass of CH_4 is16.

a) Find the number of molecules in 1GMM CH_4 .

b) Find out the number of moles and molecules in 8g of CH_4.

15 . Certain data regarding various gases kept under the same conditions of temperature and pressure are given below.

Gas	Volume (L)	No. of molecules
Nitrogen	22.4 L	6.022x10^{23}
Oxygen	112 L	5 X 6.022x10^{23}
Ammonia	224 L	A
Carbon dioxide	B	2 x 6.022x10^{23}

a) Find A and B

b) Which gas law is applicable here?

Each question from 15 to 17 carries 4 scores.

16. Complete the table given.

Compound	Mass in grams	Number of GMM	Number of molecules
NH_3	170g	.....(a).....	.....(b).....
SO_2	.....(c).....	.....(d).....	5 x 6.022 x 10^{23}

(Hint :Molecular mass NH_3 = 17, SO_2 = 64)

17. a) The number 6.022 x 10^{23} is known as .....

b) Find out the number of mole molecules and molecules in 640g SO_2.

[Hint : Molecular mass SO_2 = 64]

c) How many grams of CO_2 is to be taken to get as many molecules as are in 640g SO_2? [Hint : Molecular mass CO_2 = 44]

18. Some samples of certain compounds are given.

P - 85 g NH_3
Q - 88g CO_2
R - 20 g H_2
S - 400g $CaCO_3$

a) Calculate the molecular mass of $CaCO_3$.

[Hint : Atomic mass Ca = 40 , C = 12, O = 16]

b) How many GMM are there in each sample ?
(Hint : molecular mass NH_3 - 17, CO_2 - 44, H_2 - 2)

c) Find out number of molecules in sample R.

NON FOCUS AREA QUESTIONS

1. Volume of 1 mole gas at STP= ----------
2. 112L Ammonia gas at STP.
   a) Find the number of moles in it ?
   b) Calculate the number of molecules in it ?
   c) Find the volume 3 X 6.022 x 10^{23} CO_2 gas at STP?

3 Reactivity series and Electrochemistry

To Remember.....

- **Electrochemical series.**

Electropositive nature decreases

K > Na > Ca > Mg > Al > Zn > Fe > Ni > Sn > Pb > Cu > Ag > Au

Electropositive nature increases

- A highly electropositive metal can displace less electropositive metal from its salt solution.
- **In galvanic cell**

  Highly electropositive metal – Anode (Oxidation)

  Less electro positive metal – Cathode (Reduction)

  Direction of electron flow – Anode to Cathode
-

Cell	Energy change
Galvanic cell	Chemical energy to electrical energy
Electrolytic cell	Electrical energy to chemical energy

NON FOCUS AREA

- **Electrolysis of molten sodium chloride sodium chloride solution**

Electrolyte	Reaction		Products	
	Anode	Cathode	Anode	Cathode
Molten NaCl	Oxidation $2Cl - 2e^- \rightarrow Cl_2$	Reduction $Na^+ + 1e^- \rightarrow Na$	Chlorine (Cl_2)	Sodium (Na)
Aqueous Solution of NaCl	Oxidation $2Cl - 2e^- \rightarrow Cl_2$	Reduction $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$	Chlorine (Cl_2)	Hydrogen (H_2)

- **Electroplating**

Anode	Metal to be plated
Cathode	Article to electroplated
Electrolyte	Salt solution of the metal to be coated

- **Electrolytes use for electroplating gold ,silver and copper**

Metals to be covered	Electrolyte
Silver	Silver nitrate solution/sodium cyanide + silver cyanide solution
Gold	Sodium cyanide + gold cyanide solution
Copper	Copper Sulphate solution

Each question from 1 to 4 carries 1 marks

1. Which of the following metals can displace Fe from $FeSO_4$
(Ag, Cu, Au, Zn)

2. Electrode at which oxidation takes place is called ----------

3. In Fe-Cu Cell, which electrode acts as anode?

Each question from 5 to 6 carries 2 marks

4. $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$
   a) Name the type of reaction takes place here.
   b) Write down reduction reaction in the above reaction ?

5. $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$
   a) Which ion is responsible for the blue colour of $CuSO_4$ solution ?
   b) Write down the oxidation reaction takes place here ?

Each question from 7 to 8 carries 3 marks

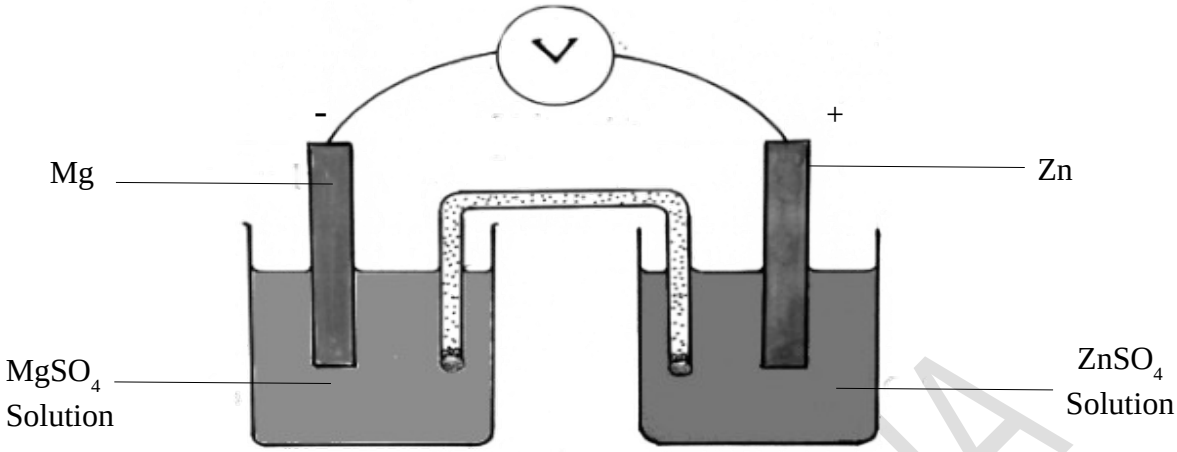
6. Analyse the following reactions and answer the following questions.
   (Hint : Oder of reactivity Mg>Zn>Fe>Cu)
   Testtube1 : A copper rod is dipped in $FeSO_4$ solution
   Testtube 2 : A Zinc rod is dipped in $FeSO_4$ solution
   a) In which test tube does displacement reaction take place ? Give reason ?
   b) Write the redox reaction taking place here

Each question from 9 to 10 carries 4 marks

7. Fe rod is dipped in $CuSO_4$ Solution.
   a) What changes takes place in the Fe rod after some time ?
   b) Which metal undergoes oxidation ?
   c) If Ag rod is used instead of Fe, does displacement reaction takes place ? Give reason?

8. A picture of galvanic cell is given below

(Hint:- Reactivity- Mg > Zn)



a) Which is the energy change takes place in the galvanic cell ?

b) Write down the reaction takes place at cathode ?

c) Which electrode acts as anode ?

d) Write the redox reaction takes place in this cell ?

NON FOCUS AREA

1.When sodium chloride solution undergo electrolysis ..... is obtained at cathode 1 Mark

2. Electrolyte used to electroplate gold is ..... 1 Mark

3. Which is the product obtained at the anode during the electrolysis of molten sodium chloride? 1 mark

4.In the process of electroplating copper on Iron bangle 3 Mark

a) Which solution is used as electrolyte

b) Write the reaction taking place at cathode ?

c) Which is the anode ?

5.Sodium chloride solution is electrolysed 3 Mark

a) Which substance is obtained in the anode ?

b) Write the equation for reaction takes place in cathode ?

c) Write any one use of electrolysis

6. Electrolysis of molten sodium chloride (NaCl) is conducted. 3 Mark

a) Which are the ions present in the molten sodium chloride?

b) Which ion is attracted towards positive electrode ?

c) Write down the reaction takes place in cathode ?

To Remember

■ Metals and ores

Metal	Ores	Chemical formula
Iron	Haematite magnetite	Fe_2O_3 Fe_3O_4
Copper	Copper pyrites Cuprite	$CuFeS_2$ Cu_2O
Zinc	Zinc Blend Calamine	ZnS $ZnCO_3$
Aluminium	Bauxite	$Al_2O_3.2H_2O$

■ Methods of Concentration of ores

Properties of ores	Properties of the impurities present in the ore	Method of concentration
High density	Low density .	Levigation or hydraulic washing
Magnetic in nature	Non magnetic in nature	Magnetic separation
Lighter sulphide ores	High density	Froth floatation
Aluminium ores that get dissolved in a solution	Insoluble in the same solution	Leaching

■ Metals and purification methods

Metal	Purification Method	Property used
Tin, Lead	Liquation	Low melting point of metals
Zinc, Cadmium, Mercury	Distillation	Low boiling point of metals

■ **Extraction of iron.**

Ore of iron	Haematite (Fe_2O_3)
Raw materials fed into the blast furnace	Powdered haematite , Coke, Calcium carbonate ($CaCO_3$)
The compound used for reducing haematite	Carbon monoxide (CO)
Gangue	Silica (SiO_2)
Flux	Calcium Oxide (CaO)
Slag	Calcium Silicate ($CaSiO_3$)
Equation of formation of slag	$CaO + SiO_2 \rightarrow CaSiO_3$
Name of iron obtained from blast furnace	Pig Iron

■ **Alloy Steel**

Alloy steels	Constituent elements	Properties	Uses
Stainless steel	Fe, Cr, Ni, C	Hard	For the manufacture of utensils, parts of vehicles
Alnico	Fe, Al, Ni, Co	Magnetic nature	For the manufacture ofpermanent magnets
Nichrome	Fe, Ni, Cr, C	High resistance	For making heating coils

NON FOCUS AREA

Extraction Of Aluminium (Hall- Herault process)

A. Concentration of Bauxite

Ore of Aluminium	Bauxite ($Al_2O_3.2H_2O$)
Method of concentration	Leaching
Solvent used	Hot NaOH
Chemical formula of Alumina	Al_2O_3

B. Electrolysis of Alumina

Anode	Carbon rod
Cathode	Carbon lining of the Iron tank
Electrolyte	Alumina dissolved in Molten Cryolite
Reaction at anode	$2O^{2-} \rightarrow 2O_2 + 4e$
Reaction at cathode	$Al^{3+} + 3e \rightarrow Al$

Each question from 1 to 9 carries 1 scores

1. Find the relation and fill in the blanks.
   Iron – Haematite
   Aluminium – ----------

2. Find the relation and fill in the blanks.
   Tin Stone – SnO_2
   Calamine – ----------

3. Find the relation and fill in the blanks.
   $ZnCO_3$ – Calcination
   Cu_2S - ----------

4. Which among the following metals is refined by liquation ?
   (Zinc, Copper, Mercury, Tin)

5. Iron obtained from blast furnace is called ----------

6. The compound used as reducing agent in the blast furnace is ----------

7. ---------- is the process of heating the concentrated ore in the absence of air at temperature below its melting point.

8. Bauxite ore is concentrated by ---------- method.

9. Which electrolyte is used in the electrolytic refining of copper ?

Each question from 10 to 13 carries 2 scores.

10. (a) Write are the gangue, flux in blast furnace?
    (b) Write the equation of slag formation reaction.

11.Complete the table

Ore	Method of concentration
Tin Stone	.....(a.).....
Zinc Blend	.....(b).....

12. There are two methods employed for converting concentrated ore into its oxide.
    1. Calcination
    2. Roasting

    a) Among these which method is used for converting $ZnCO_3$ into ZnO ?
    b) What is the difference between calcination and roasting ?

13. Complete the table.

Metal	Characteristics	Method of refining
Zn	A	Distillation
Tin	Low melting point	B

Each question from 14 to 15 carries 3 scores.

14. Haematite is converted into iron in blast furnace. Analyse the following equations and answer the questions.

$CaCO_3 + Heat \rightarrow A + CO_2$

$A + SiO_2 \rightarrow B$

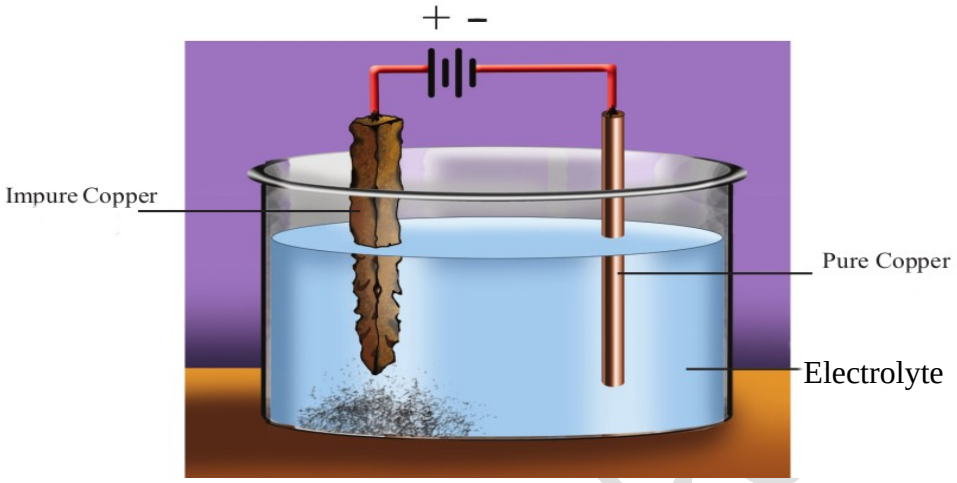
$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

a) Find A and B ?

b) What is the function of A in the blast furnace ?

c) Name the reducing agent used in the extraction of iron.

15. Analyse the diagram and complete the following table.



Anode	A
Cathode	B
Name of electrolyte	C

16. Some Alloy steels are given below. Anlayse them and answer the following questions

Stainless steel, Alnico, Nichrome

a) Among these which alloy steels have same components.

b) Among these which alloy steel is used for making heating coil ?

c) Among these which alloy steel contain Cobalt as constituent element ?

Question 17 carry 4 marks

17. Match the columns A,B And C suitably

A Properties of ores	B The method of concentration	C Example
Ore particle is heavier than impurities.	Leaching	Tin Stone
Ore particle is lighter than impurities.	Magnetic separation	Bauxite
Magnetic nature of ore	Froth Floatation	Ore of Gold
Ore particle soluble in suitable solvent	Levigation	Zinc Sulphide

NON FOCUS AREA

1. Name the solvent used for the purification of bauxite? 1 Mark
2. Write the chemical formula of alumina 1mark
3. Aluminium is extracted by the electrolysis of alumina dissolved in molten cryolite 4 mark
   A) Which are the ions present in alumina ?
   B) Write the name of product obtained in anode
   C) What is the role of cryolite ?

5 Compounds of Non - Metals

To Remember.....

- Laboratory preparation of ammonia

Reactants	Ammonium Chloride, Calcium hydroxide
Drying agent	Calcium Oxide

- $NH_4Cl \rightleftharpoons NH_3 + HCl$
  NH_3 -Basic nature HCl - Acidic nature
- **Characteristics of Chemical equilibrium**
  - At the equilibrium both the reactants and the products coexist.
  - The rates of forward and backward reactions become equal at equilibrium.
  - Chemical equilibrium is dynamic at the molecular level.
  - Chemical equilibrium is attained in closed systems
- **Le Chateliers' Principle**

  When the concentration, pressure or temperature of a system at equilibrium is changed, the system will readjust itself so as to nullify the effect of that change and attain a new state of equilibrium.

  - Effect of various changes happening in chemical equilibrium

Change	Effect
Concentration of reactants increases	Rate of forward reaction increases
Concentration of reactants decreases	Rate of forward reaction decreases
Concentration of product increases	Rate of forward reaction decreases
Concentration of product deceases	Rate of forward reaction increases
Temperature increases	Rate of endothermic reaction increases
Temperature decreases	Rate of exothermic reaction increases
Pressure increases	Increase the rate of reaction in the direction in which number of molecules decreases.
Pressure decreases	Increase the rate of reaction in the direction in which the number of molecules increases

NON FOCUS AREA

Uses of Sulphuric Acid

Refining of petroleum
Manufacture of paints
Manufacture of fertilisers
Manufacture of explosives
Manufacture of fibres

Industrial preparation of Sulphuric Acid

$S + O_2 \rightarrow SO_2$

$SO_2 + O_2 \underset{450^0c \text{ (optimum temperature)}}{\overset{V_2O_5(\text{catalyst})}{\rightleftharpoons}} SO_3$

$So_3 + H_2SO_4 \rightarrow H_2S_2O_7$ (oleum)

$H_2S_2O_7 + H_2O \rightarrow 2\ H_2SO_4$

The dissolution of sulphur trioxide in water is an exothermic process. It may turn sulphuric acid initially formed into fine fog like particles (smog) which will hinder further dissolution.

Chemical properties Of Sulphuric Acid

Property	Example
Dehydrating nature	$C_{12}H_{22}O_{11} \xrightarrow{\text{Con. } H_2SO_4} 12C + 11H_2O$ Reaction of Conc H_2SO_4 with $CuSO_4.5H_2O$ Reaction of Conc H_2SO_4 with Cotton Cloth and Glucose
Drying nature	Concentrated sulphuric acid is used as a drying agent in the preparation of Cl_2 , SO_2 and HCl.
Oxidising nature	$C + 2H_2SO_4 \rightarrow CO_2 + 2H_2O + 2SO_2$ $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

Identification of sulphate ions

Reagent used : Barium Chloride
Colour of precipitate : White precipitate of $BaSO_4$

Each question from 1 to 9 carries1 marks

1. Reactants used for the laboratory preparation of Ammonia are -------- and --------
2. Drying agent used in the laboratory preparation of ammonia is ------
3. In a reversible reaction the reaction from left to right is called -----
4. Which is the basic nature substance formed by the decomposition of ammonium chloride ?
5. Write the backward reaction from the following reversible reaction.
   $N_2 + 3H_2 \rightleftharpoons 2NH_3$
6. Write the name of concentrated aqueous solution of ammonia ?
7. Which of the following is true about reversible reaction?
   i) Reaction stops after some time.
   ii) Reaction attain equilibrium after some time
   iii) Reaction takes place only in one direction.

8. What is the optimum temperature used in the manufacture of ammonia?
9. Which of the following substance is used as a refrigerant in ice plants.

(NH_3 ,HCl , SO_2 , H_2SO_4)

Each question 10 to 18 carries 2 marks

10. $NH_4Cl \underset{B}{\overset{A}{\rightleftharpoons}} NH_3 + HCl$

Identify the reactions A and B

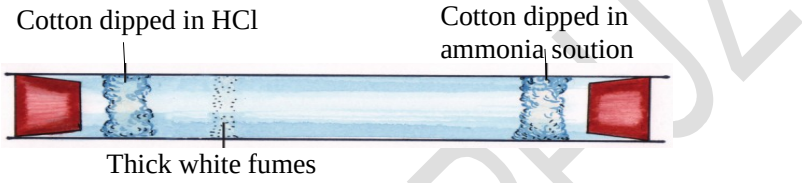
11. In which of the following reversible reactions the change in pressure does not influence the equilibrium? What is the reason ?

i) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

ii) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

12. Calcium oxide (CaO) is used as drying agent in the preparation of Ammonia in laboratory. Can concentrated H_2SO_4 be used as drying agent instead of CaO? Justify your answer.

13. Analyse the following diagram and observations given below.



Observation :- A white substance is formed

a) Which is the white substance formed here ?

b) Write the balanced chemical equation of the reaction?

14 $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + Heat$

a) What change is to be made in pressure to get maximum yield of the products?

b) What is the change in concentration of product is required for increasing the rate of the forward reaction?

15. Ammonia is a gas that highly soluble in water and it can be liquefied easily by applying pressure.

a) What is the name of concentrated aqueous solution of ammonia ?

b) What is the name of liquefied ammonia ?

16. Ammonia is manufactured by Haber process.

a) What is the optimum temperature used in this process ?

b) Write any two uses of ammonia ?

17. A reversible reaction can attain chemical equilibrium after some time.

a) Write any one characteristics of chemical equilibrium ?

b) What happens when concentration of reactants is increased at chemical equilibrium?

18. $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g) + Heat$

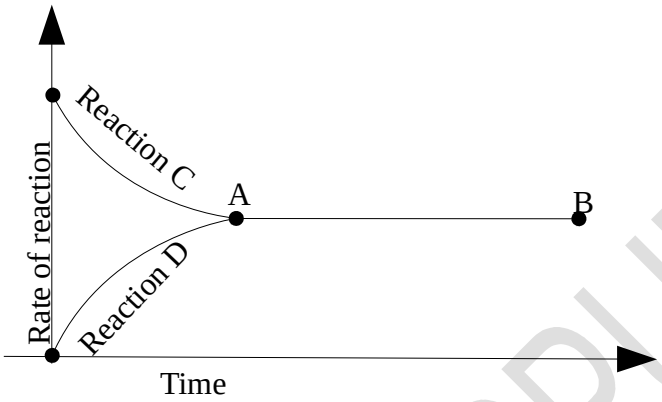
Identify the effect of following changes in forward reaction.

a) Pressure is decreased.

b) Products are frequently removed from the system.

Each question from 19 to 21 carries 3 marks

19. The graph for the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is given below. Analyse it and answer the following questions



a)Identify the reactions C and D

b) Which stage of reaction is shown by the portion AB of the graph?

20. Take some ammonium chloride (NH_4Cl) in a boiling tube and heat it. When a wet red litmus shown at the mouth of the boiling tube it changes to blue.

a) Which are the gases produced ?

b) Write the chemical equation of the reaction occurred here?

c) Which gas is responsible for the colour change of the litmus paper ?

Each question from 21 to 22 carries 4 marks.

21. a) What are the reactants used in laboratory preparation of ammonia ?

b) Write the balanced chemical equation of the reaction ?

c) Which is the drying agent used ?

d) Ammonia is collected in the gas jar by keeping mouth downwards. Why?

22. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + Heat.$

What happens in the yield of ammonia when following changes are made ?

a) Concentration of Nitrogen is increased.

b) Temperature is decreased.

c) NH_3 is removed from the system.

d) Pressure is increased.

NON FOCUS AREA

1. Catalyst used in the preparation of sulphuric acid is ---------- 1 Mark

2. Optimum temperature used in the preparation of sulphuric acid ---------- 1 Mark

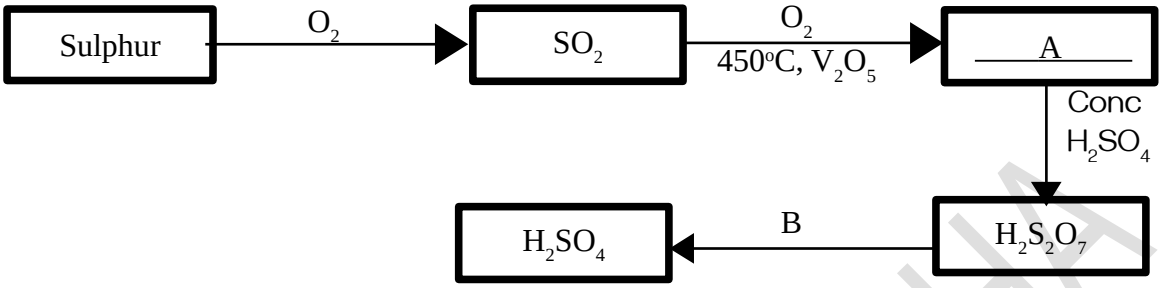
3. Chemical formula of oleum is ---------- 1 Mark

4. Which property of Sulphuric Acid shown among the following reactions

a) Conc H_2SO4 is added with sugar 1 mark

b) During the laboratory preparation of SO_2 1 mark

5. Following flowchart is related to the industrial preparation of sulphuric acid



a) Write the name of substances A and B? 2 mark

b) Write any one use of sulphuric acid? 1 Mark

c) Sulphuric is formed by the direct dissolution of the sulphur trioxide in water. But this method is not used Give reason? 1 Mark

6 Nomenclature of organic compounds and isomerism

To Remember.....

- **General formula**

Alkanes	C_nH_{2n+2}
Alkenes	C_nH_{2n}
Alkynes	C_nH_{2n-2}

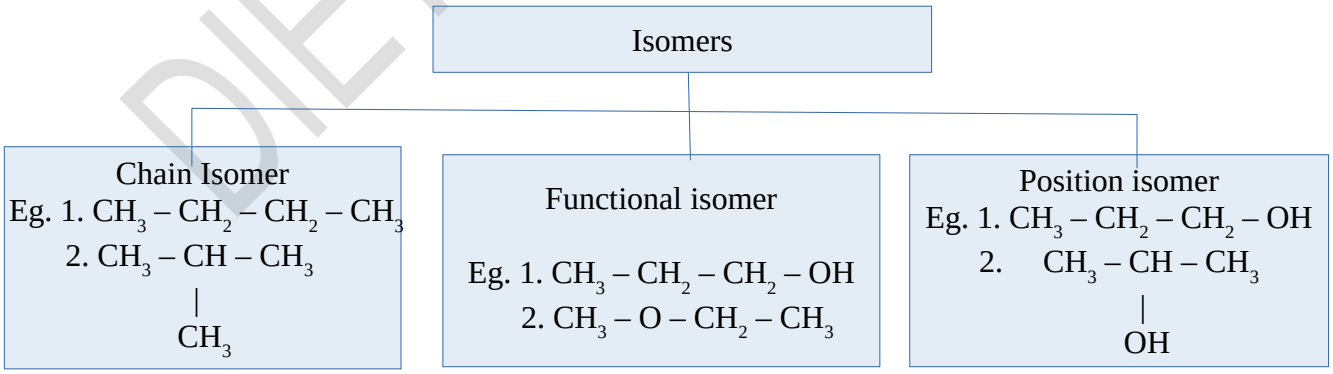
- **Homologous series characteristics**

The members can be represented by a general formula.
Successive members differ by a CH_2 group.
Members show similarity in chemical properties.
There is a regular gradationin their physical properties.

- **Functional group**

Name of Functional group	Functional group	Common name of compounds
Hydroxyl group	-OH	Alcohol
Alkoxy group	- O -	Ether
Carboxylic group	COOH	Carboxylic Acid
Halo group	-Cl, -Br, -F, -I	Halo compounds

NON FOCUS AREA



Each question from1 to 9 carries 1 marks

1. The general formula of alkanes is ----------
2. The general formula of alkynes is ----------
3. Find the odd one out

(C_2H_6, C_3H_8, C_5H_{10}, C_6H_{14})

4. Find the missing member in the following homologous series .
   C_2H_2, C_3H_4, C_4H_6 , ... , C_6H_{10}
5. Which of the following is an unsaturated compound?
   (C_2H_6, C_3H_4, C_5H_{12}, C_6H_{14})
6. Which of the following is a saturated compound ?
   (C_2H_6, C_3H_6, C_5H_8, C_6H_{12})
7. Name of the functional group OH is ----------
8. Write the structure of But – 2 – yne.

Each question from 9 to 12 carries 2 marks

9. Molecular formulae of some hydrocarbons are given.

   C_3H_6 , C_4H_8 , C_5H_{10} , C_6H_{12}

   a) To which Homologous series do these belong?
   b) Write its general formula ?
10. A structure of hydrocarbon is given below
    $CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$
    a) Write its IUPAC name ?
    b) In which homologous series does this compound belongs ?
11. Details regarding an unsaturated hydrocarbon is given below.
    - There are five carbon atoms in the main chain .
    - A double bond is present between second and third carbon atom.

    a) Write the structure of this compound ?
    b) Write the IUPAC name of the compound ?
12. A student write the IUPAC name of an organic compound as 2-ethyl Pentane. Teacher says that it is wrong.
    a) Draw the structure of this compound.
    b) Write its correct IUPAC name.

Each question from 13 to 14 carries 3 marks

13 Analyse the given structures and answer the following questions.

a) $CH_3 – CH_2 – CH_2 – O – CH_3$

b) $CH_3 – CH_2 – CH_2 – OH$

c) $CH_3 – CH_2 – O – CH_3$

i) Identify the isomer pair from the above compounds.
ii) Which type of isomerism is exhibited ?
Iii) Write the structural formula of position isomer of compound (b)?

14. Structure of an alcohol is given below. Analyse it and answer the following questions.

$CH_3 – CH_2 – CH_2 – OH$

a) Write the IUPAC name of this compound ?

b) Write the structure and IUPAC name of functional isomer of this compound ?

Each question from 15 to 17 carries 4 marks

15. Analyse the structure and answer the following questions.

$$CH_3 – CH_2 – CH_2 – \underset{\displaystyle CH_3}{\underset{|}{CH}} – CH_3$$

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

b) what is the position of the branch ?

c) What is name of branch ?

d) Write its IUPAC name ?

16. Complete the table

Structural formula	IUPAC name
a	2-Methyl propane
$CH_3 - CH_2 - CH = CH_2$	b
c	Ethoxy propane
d	But – 1- ene

NON FOCUS AREA

1. Structural formula of some organic compounds are given below 3 marks

i) $CH_3 – CH_2 – CH_2 – CH_3$

ii) $CH_3 – CH_2 – CH_2 – OH$

iii) $CH_3 – \underset{\displaystyle OH}{\underset{|}{CH}} – CH_3$

a) Write the structure of chain isomer of compound (i)

b) Which compounds have the same molecular formula ?

c) Write the structural formula and IUPAC name of functional isomer of compound (iii)

2. Write all possible chain isomer of Pentane (C_5H_{12}) 3 marks

7 Chemical Reactions of Organic Compounds

To Remember

NON FOCUS AREA

- **Alcohol**

Structure of Alcohol	Name of Alcohol
$CH_3 – CH_2 – OH$	Grape spirit, Ethyl Alcohol, Ethanol
CH_3 - OH	Wood spirit, Methyl Alcohol, Methanol

- **Use of Alcohol**
  - Used as a solvent
  - Used as a beverage
  - Used as a solvent for medicine
  - Used as fuel
- **<u>Industrial preparation of Ethanol</u>**

  Ethanol is manufactured by fermenting dilute molasses by adding yeast. Within a few days it changes to ethanol in the presence of the enzymes invertase and zymase produced by yeast.

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

  Sucrose (Sugar) — Glucose — Fructose

  $C_6H_{12}O_6 \xrightarrow{\text{Zymase}} 2C_2H_5\text{-OH} + 2CO_2$

  Ethanol

  The ethanol thus obtained will be about 8 - 10% strong. It is known as 'wash'. This is subjected to fractional distillation to get 95.6% strong ethanol solution known as 'rectified spirit'.

8-10% alcohol	Wash
95.6 % Ethanol	Rectified spirit
Ethanol + Poison (To prevent the illicit use as beverage)	denatured spirit'
Ethanol + Methanol	Methylated spirit
99% spirit	Absolute alcohol
Ethanol + petrol	Power Alcohol

- **Carboxylic Acids**

HCOOH	Methanoic Acid, Formic Acid
CH_3 – COOH	Ethanoic Acid, Acetic acid
CH_3 - CH_2 - COOH	Propanoic acid, propionic Acid
5 - 8% ethanoic acid (acetic acid)	vinegar.

- **Fatty Acid :-** Organic acids containing more number of carbon atoms are called fatty acids.
- **Vinegar :-** About 5 - 8% ethanoic acid (acetic acid) is known as vinegar. Vinegar is obtained when ethanol is subjected to fermentation in the presence of air using the bacteria acetobacter.

- **Industrial preparation of Ethanoic Acid**

  Ethanoic acid can be manufactured by treating methanol with carbon monoxide in the presence of catalyst.

  CH_3 - OH + CO $\xrightarrow{\text{catalyst}}$ CH_3 - COOH
  methanol ethanoic acid

- **uses of the ethanoic acid**

  In manufacture of rayon.
  In rubber and silk industry.

- **Ester**

  Esters are obtained by the reaction between alcohols and carboxylic acids. This reaction is called esterification. Esters have the pleasant smell of fruits and flowers.
  functional group of ester is – COO -

  CH_3 – COOH + HO – CH_2 – CH_3 $\xrightarrow{\text{Conc H2SO4}}$ CH_3 – COO – CH_2 – CH_3 + H_2O
  Ethanoic Acid Ethanol Ethylethanoate

Each question from 1 to 5 carries 1 score.

1. Which is the monomer of Teflon?
2. CH_3 - CH_2 -CH_3 ⟶ A + CH_4
   What is the molecular formula of the compound A.
3. Which is the main component in LPG?
4. Which of the following molecule can undergo addition reaction?
   (Methane , Ethane , Propene , Butane)
5. CH_3 - CH = CH_2 + H_2 ⟶ A

   Write the IUPAC name of the compound A.

Each question from 6 to 8 carries 2 scores.

6. $CH_4 + Cl_2 \xrightarrow{\text{Sunlight}} A + HCl$

a) What is the IUPAC name of the compound A?

b) To which type does this reaction belong?
(Addition reaction, Substitution reaction, Combustion, Polymerisation)

7. a) Which is the main component in LPG?

b) What are the products obtained by the combustion of LPG?

8. $CH_3 - CH_2 - CH_3 \longrightarrow A + CH_4$

a)Write the structural formula of compound A.

b) Which type of chemical reaction is this?

Each question from 9 to 10 carries 2 scores.

9. Given below are two chemical equation.

i) $CH \equiv CH + H_2 \longrightarrow X$

ii) $X + H_2 \longrightarrow Y$

a) Identify the products X and Y .

b) By which name this type of reaction is known?

10. Complete the following equations

a) $C_2H_6 + Cl_2 \longrightarrow$ ----- + HCl

b) $C_3H_6 + Cl_2 \longrightarrow$ --------

c) n $CH_2 = CH_2 \longrightarrow$ ---------

Each question from 11 to 12 carries 2 scores.

11. Match the columns A,B and C suitably.

A Reactants	B Products	C Name of Reaction
$CH_4 + Cl_2$	$CO_2 + 2H_2O$	Addition
$CH_4 + 2O_2$	$CH_2 = CH_2$	Thermal Cracking
$CH_3 - CH_2 - CH_3$	$CH_3Cl + HCl$	Combustion
$CH \equiv CH + H_2$	$CH_2 = CH_2 + CH_4$	Substitution

12. The given table is related to different type reactions of hydrocarbons. Fill in the blanks.

$CH_4 +$ a	$\longrightarrow$	$CO_2 + H_2O$
$C_2H_6 + Cl_2$	$\longrightarrow$	b + HCl

c	+ H_2 ⟶	$CH_3 - CH_3$
n $CH_2 = CH_2$	⟶	d

NONFOCUS AREA

1. 5-8 % concentrated ethanol obtained by the fermentation of molasses is called ------ 1 Mark
2. 5-8% concentrated ethanoic acid is called ---------- 1 mark
3. Rectified spirit is prepared from wash by ..... 1 Mark
4. Which of the following compounds are used for making ester 1 Mark

   ($CH_3 – OH$, $CH_3 – O - CH_3$, $CH_3 - COOH$, C_2H_5)

5. Ethanoic acid is a carboxylic acid 3 mark

   a) How is ethanol industrially prepared ?

   b) What is vinegar ? How is it prepared ?

6. Following are the equations showing the industrial preparation of ethanol 3 Mark

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

   $C_6H_{12}O_6 \xrightarrow{B} 2C_2H_5\text{-}OH + 2CO_2$

   a) Write the name of A and B

   b) What is methylated spirit ?

   c) Write any one use of alcohol ?

1 Periodic Table and Electronic Configuration

Qn. No	Answer Key / Value points	Score	Total Score
1.	2d	1	1
2.	10	1	1
3.	K	1	1
4.	3d	1	1
5.	3 (s , p, d)	1	1
6.	d	1	1
7.	3	1	1
8.	+3	1	1
9.	$1s^2\ 2s^2\ 2p^7$	1	1
10.	a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$ b) 19	1 1	2
11.	a)+2 b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5$ / [Ar] $3d^5$	1 1	2
12.	a) & c)	1+1	2
13.	a)Q b) P & R	1 1	2
14.	a) 24 b) d	1 1	2
15.	a) $1s^2\ 2s^2\ 2p^6\ 3s^1$ b)11 c)s block	1 1 1	3
16.	a) i) +2 ii) +4 b) In d block elements, the energy between the outermost s subshell and the penultimate d subshell is very small. Hence under suitable conditions the electrons in d subshell also take part in chemical reactions. Hence transition elements show variable oxidation states.	1+1 1	3

17.	a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$ b) Period number =4 , Group number = 1	1 1+1	3
18.	a) ii) b) The half filled or fully filled d subshell elecronic configuration is more stable than other atoms c) Group number = 6 , Period number = 4	1 1 1+1	4
19.	a) X - $1s^2\ 2s^2\ 2p^6 3s^2\ 3p^5$ Y - $1s^2\ 2s^2$ b) s block c)11	1+1 1 1	4
20.	a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$ b) Z c) Group number = 5 , Period number = 4	1 1 1+1	4
NON FOCUS AREA			
1.	b. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^1$	1	1
2	f block	1	1
3.	False statement- b) s – block elements shows high ionisation energy. s – block elements shows low ionisation energy.	1 1	2

Qn. No	Answer Key / Value points	Score	Total Score
1.	Boyle's Law	1	1
2.	a) If an inflated balloon is kept in sunlight, it will burst after sometime.	1	1
3.	4 GAM	1	1
4.	44g	1	1
5.	4 GAM	1	1
6.	3 GMM	1	1
7.	a) 1L b) Boyle' Law	1 1	2
8.	size increases , As the bubbles move from bottom to top in a water body, pressure decreases and correspondingly the volume increases.	2	2

9.	a) 20 L b) Charles' Law	1 1	2
10.	a) 44g b) 5 Moles (5 x $6.022x10^{23}$ molecules)	1 1	2
11.	a) $6.022x10^{23}$ atoms b) 56 g	1 1	2
12.	a) X = 400 atm , Y = 900 L b) Directly propotional	1+1 1	3
13.	a) 5 GAM b) 5 x $6.022x10^{23}$ c) 142 g	1 1 1	3
14.	a) $6.022x10^{23}$molecules b) Number of moles = 0.5 Number of molecules = 0.5 x $6.022x10^{23}$	1 1 1	3
15	a) A = 10 x $6.022x10^{23}$ B= 44.8L b) Avogadro's law	1+1 1	3
16.	a) 10 b) 10 x $6.022x10^{23}$ c) 320g d) 5	1 1 1 1	4
17	a) Avagadro number b) Number of mole molecules = 10 Number of molecules = 10 x $6.022x10^{23}$ c) 440g	1 1 1 1	4
18.	a) 100 b) Number of GMM P =5 , Q = 2, R = 10, S = 4 c) 10 x $6.022x10^{23}$	1 1/2 x 4 1	4
NOON FOCUS AREA			
1	22.4L	1	1
2	a) 5 b) 5 x $6.022x10^{23}$ molecules c) 3 x 22.4 L = 67.2 L	1 1 1	3

Qtn No	Answer Key/ Value Points	Score	Total Score
1	Zn	1	1
2	Anode	1	1
3.	Fe	1	1
4.	a) Displacement reaction b) $2Ag^{1+} + 2e^{-} \rightarrow 2Ag$	1 1	2
5	a) Cu^{2+} b) $Fe \rightarrow Fe^{2+} + 2e^{-}$	1 1	2
6	a) Test tube -2, Zn more reactive than Fe b) $Zn + Fe^{2+} \rightarrow Zn^{2+} + Fe$	1 1	2
7.	a) Cu deposited over Fe rod b) Fe c) If Ag is used instesd of Fe displacement reaction does not takes place. Reactivity of Ag is less than Cu	1 1 1 1	4
8.	a) Chemical energy is converted to electrical energy. b) $Zn^{2+} + 2e^{-} \rightarrow Zn$ c) Mg d) $Mg + Zn^{2+} \rightarrow Mg^{2+} + Zn$	1 1 1 1	4
NON FOCUS AREA			
1.	Hydrogen	1	1
2.	Sodium cyanide + Gold cyanide	1	1
3.	a) Copper sulphate solution b) $Cu^{2+} + 2e^{-} \rightarrow Cu$ c) Copper	1 1 1	3
4.	Cl_2(Chlorine)	1	1
5.	a) Cl_2 b) $2H_2O + 2e^{-} \rightarrow H_2 + 2OH^{-}$ c) Any one use	1 1 1	4
6.	a) Na^{+}, Cl^{-} b) Cl^{-} c) $Na + 1e^{-} \rightarrow Na$	1 1 1	3

4 Production of Metals

Qtn No	Answer Key/ Value Points	Score	Total Score
1	Bauxite	1	1
2	$ZnCO_3$	1	1
3.	Roasting	1	1
4.	Tin	1	1
5.	Pig iron	1	1
6.	Carbon Monoxide (CO)	1	1
7.	Calcination	1	1
8.	Leaching	1	1
9.	$CuSO_4$ (Copper Sulphate)	1	1
10	a) Gangue- Silica(SiO_2) Flux- CaO b) $SiO_2 + CaO \rightarrow CaSiO_3$	1 1	2
11	a) Magnetic separation b) Froth floatation	1 1	2
12	a) Calcination b) Definition of calcination and roasting.	1 1	2
13.	A) Low boiling point B) Liquation	1 1	2
14	a) A – CaO B- $CaSiO_3$ b) It is used as flux c) Carbon monoxide (CO)	½+½ 1 1	3
15	A) Impure copper B) Pure copper C) Copper Sulphate solution	1 1 1	3
16	a) Stainless Steel and Nichrome b) Nichrome c) Alnico	1 1 1	3
17	Ore particle is heavier than impurities. – Levigation – Ore of Gold Ore particle is lighter than impurities. – Froth floatation – Zinc Sulphide Magnetic nature of ore – Magnetic separation – Tin Stone	½+½ ½+½	4

	Ore particle soluble in suitable solvent	Leaching	Bauxite	½+½ ½+½	
NON FOCUS AREA					
1	Hot NaOH			1	1
2.	Al_2O_3			1	1
3.	a) Al^{3+} and O^{2-} b) Oxygen c) to reduce the melting point of alumina and to improve the Electrical conductivity of Alumina			½ +½ 1 2	4

Qtn No	Answer Key/ Value Points	Score	Total Score
1	Ammonium Chloride (NH_4Cl) and Calcium hydroxide [$Ca(OH)_2$]	½+½	1
2	CaO	1	1
3.	Forward reaction	1	1
4.	NH_3	1	1
5.	$2NH_3 \rightarrow N_2 + 3H_2$	1	1
6.	Liquor ammonia	1	1
7.	ii) Reaction attain equilibrium after some time	1	1
8.	450 °C	1	1
9.	NH_3	1	1
10	A- Forward reaction $NH_4Cl \rightarrow NH_3 + HCl$ B- Backward reaction $NH_3 + HCl \rightarrow NH_4Cl$	1 1	2
11	i) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ Total number of reactant molecules and product molecule are equal	1 1	2
12	a) H_2SO_4 is not used as drying agent instead of CaO in the preparation of ammonia b) H_2SO_4 is an acid and NH_3 is a base . So they react each other.	1 1	2
13.	a) NH_4Cl (Ammonium Chloride) b) $NH_3 + HCl \rightarrow NH_4Cl$	1 1	2

14	a) Increase the pressure. b) Decrease the concentration of NH_3 (Removing NH_3 frequently)	1 1	2
15	a) liquor ammonia b) Liquid ammonia	1 1	2
16	a) 450 ^oC b) Writes any two use	1 ½+½	2
17	a) Writes any one characteristic b) Equilibrium changes.	1 1	2
18	a) Rate of forward reaction decreases b) Rate of forward reaction increases	1 1	2
19	a) Reaction C- Forward reaction $N_2 + 3H_2 \rightarrow 2NH_3$ Reaction D – Backward reaction - $2NH_3 \rightarrow N_2 + 3H_2$ b) Chemical equlibrium	1 1 1	
20	a)Ammonia (NH_3) Hydrogen chloride (HCl) b) $NH_4Cl \rightleftharpoons NH_3 + HCl$ c) NH_3	½+½ 1 1	3
21	a) Ammonium Chloride (NH_4Cl) and Calcium hydroxide [$Ca(OH)_2$] b) $2NH_4Cl + Ca(OH)_2 \rightarrow CaCl_2 + 2H_2O + 2NH_3$ c) CaO d) Ammonia is lighter than air	1 1 1	3
22	a) Rate of forward reaction increases. So more NH_3 is formed b) Rate of forward reaction increases. So more NH_3 is formed c) Rate of forward reaction increases. So more NH_3 is formed d) Rate of forward reaction increases. So more NH_3 is formed	1 1 1 1	4
NON FOCUS AREA			
1	V_2O_5	1	1
2.	450 ^oC	1	1
3.	$H_2S_2O_7$	1	1
4	a) Dehydrating property b) Drying property	1 1	2
5.	a) A – SO_3 B- H_2O b) The dissolution of SO3 in water is an exothermic process. It may turn sulphuric acid initially formed in the smog. Whic will hinder furher dissolution	1+1 1	3

6 Nomenclature of organic compounds and isomerism

Qtn No	Answer Key/ Value Points	Score	Total Score
1	C_nH_{2n+2}	1	1
2	C_nH_{2n-2}	1	1
3.	C_5H_{10}	1	1
4.	C_5H_8	1	1
5.	C_3H_4	1	1
6.	C_2H_6	1	1
7.	Hydroxyl	1	1
8.	$CH_3 - C \equiv C - CH_3$	1	1
9.	a) Alkene b) C_nH_{2n}	1	1
10	a) Hexane b) Alkane	1 1	2
11	a) $CH_3 - CH = CH - CH_2 - CH_3$ b) Pent – 2– ene	1 1	2
12	a) $CH_3 - CH_2 - CH_2 - CH(CH_2 - CH_3) - CH_3$ OR $CH_3 - CH(CH_2 - CH_3) - CH_2 - CH_2 - CH_3$ b) 3-Methyl hexane	1 1	2
13.	a) b and c or $CH_3 - CH_2 - O - CH_3$ $CH_3 - CH_2 - CH_2 - OH$ b) Functional isomerism c) $CH_3 - CH(OH) - CH_3$	1 1 1	3

14	a) Propan – 1 – ol b) $CH_3 – O – CH_2 – CH_3$, Methoxyethane	1 1 + 1	3
15	a) 5 b) 2 c) Methyl d) 2- Methylpentane	1 1 1 1	4
16	a) $CH_3 – CH(CH_3) – CH_3$ b) But – 1 – ene c) $CH_3 – CH_2 – O – CH_2 – CH_2 – CH_3$ or $CH_3 – CH_2 – CH_2 – O – CH_2 – CH_3$ d) $CH_3 – CH_2 – CH = CH_2$ or $CH_2 = CH_2 – CH - CH_3$	1 1 1 1	4
	NON FOCUS AREA		
1	a) $CH_3 – CH(CH_3) – CH_3$ b) ii) $CH_3 – CH_2 – CH_2 – OH$ iii) $CH_3 – CH(OH) – CH_3$ c) $CH_3 – O – CH_2 – CH_3$ or $CH_3 – CH_2 – O – CH_3$ Methoxyethane	1 1 1 +1	4
2	i) $CH_3 – CH_2 – CH_2 – CH_2 – CH_3$ ii) $CH_3 – CH(CH_3) – CH_2 – CH_3$ iii) $CH_3 – C(CH_3)_2 – CH_3$	1 1 1	3

Qn. No	Answer Key / Value points	Score	Total Score
1.	$CF_2 = CF_2$ / Tetrafluoroethene	1	1
2.	C_2H_4 / $CH_2 = CH_2$	1	1

<table>
<tr><td>3.</td><td>Butane / C_4H_{10}</td><td>1</td><td>1</td></tr>
<tr><td>4.</td><td>Propene</td><td>1</td><td>1</td></tr>
<tr><td>5.</td><td>Propane</td><td>1</td><td>1</td></tr>
<tr><td>6.</td><td>a) Chloromethane.
b) Substitution reaction.</td><td>1
1</td><td>2</td></tr>
<tr><td>7.</td><td>a) Butane / C_4H_{10}
b) CO_2 , H_2O</td><td>1
1</td><td>2</td></tr>
<tr><td>8.</td><td>a) $CH_2 = CH_2$
b) Thermal Cracking.</td><td>1
1</td><td>2</td></tr>
<tr><td>9.</td><td>a) X = $CH_2 = CH_2$, Y = $CH_3 - CH_3$
b) Addition reaction</td><td>1+1
1</td><td>3</td></tr>
<tr><td>10.</td><td>a) C_2H_5Cl
b) $C_3H_6Cl_2$
c) $\dashv CH_2 - CH_2 \vdash_n$</td><td>1
1
1</td><td>3</td></tr>
<tr><td>11.</td><td>
<table>
<tr><th>A
Reactants</th><th>B
Products</th><th>C
Name of Reaction</th></tr>
<tr><td>$CH_4 + Cl_2$</td><td>$CH_3Cl + HCl$</td><td>Substitution reaction</td></tr>
<tr><td>$CH_4 + 2O_2$</td><td>$CO_2 + 2H_2O$</td><td>Combustion</td></tr>
<tr><td>$CH_3 - CH_2 - CH_3$</td><td>$CH_2 = CH_2 + CH_4$</td><td>Thermal Cracking</td></tr>
<tr><td>$CH \equiv CH + H_2$</td><td>$CH_2 = CH_2$</td><td>Addition reaction</td></tr>
</table>
</td><td>1 x 4</td><td>4</td></tr>
<tr><td>12.</td><td>a) $2O_2$
b) C_2H_5Cl
c) $CH_2 = CH_2$
d) $-[-CH_2 - CH_2-]-_n$</td><td>1
1
1
1</td><td>4</td></tr>
<tr><td colspan="4">NON FOCUS AREA</td></tr>
<tr><td>1</td><td>Wash</td><td>1</td><td>1</td></tr>
<tr><td>2</td><td>Vinegar</td><td>1</td><td>1</td></tr>
<tr><td>3</td><td>Fractional distillation</td><td>1</td><td>1</td></tr>
<tr><td>4</td><td>$CH_3 - OH$, $CH_3 - COOH$</td><td>½ +½</td><td>1</td></tr>
<tr><td>5.</td><td>Ethanoic acid can be manufactured by treating methanol with carbon monoxide in the presence of catalyst.
About 5 - 8% ethanoic acid (acetic acid) is known as vinegar. Vinegar is obtained when ethanol is subjected to fermentation in the presence of air using the bacteria acetobacter.</td><td>1
1+1</td><td>1
2</td></tr>
<tr><td>6</td><td>a) A – Invertase B- Zymase
b) Methanol added rectified spirit
c) Any one use</td><td>½ +½
1
1</td><td>3</td></tr>
</table>

SSLC MODEL QUESTION
CHEMISTRY

Instructions
- Questions with same score are included in the same part where questions from focus area are in section A and questions from non focus area are in section B.
- First 15 minutes given as 'cool off time'.Use time to read and understand the questions.
- Answer the questions according to the score and time.

PART I

A. Answer any four questions from 1 to 6. Each carries 1 score. (4 x 1 = 4)

1. To which block of the periodic table does lanthanoids belong? (1)
2. Which one of the following metal is refined by liquation? (1)
   [Zinc, Iron, Copper, Tin]
3. Name the functional group - O - R. (1)
4. Find the relation and fill in the blanks (1)
   Copper pyrites : $CuFeS_2$
   Zinc blende : .....
5. Atomic mass of Nitrogen is 14. Which of the following sample contain 6.022×10^{23} Nitrogen atoms?
   (7g Nitrogen, 14g Nitrogen , 28g Nitrogen , 1g Nitrogen) (1)
6. Analyse the situations given below and write the one which is related to Charles' law. (1)
   a) If an inflated balloon is kept in sunlight, it will burst after sometime.
   b) As the balloon is being inflated,its volume increases.
   c) The size of air bubbles rising from the bottom of a water body gradually increases

B. Answer all questions from 7 to 9. Each carries 1 score. (3 x 1 = 3)

7. When sodium chloride solution is electrolysed, the gas liberated at the anode is ..... (1)
   (Na, Cl_2, H_2, O_2)
8. Which is the white precipitate obtained when a few drops of barium chloride solution are added to dilute sodium sulphate solution? (1)
9. Name the by product in the industrial production of soap. (1)

PART II

A. Answer the following question. carries 1 scores. (1 x 2 =2)

10. Examine the data given in the table.
    (Temperature and number of molecules of a gas are kept constant.)

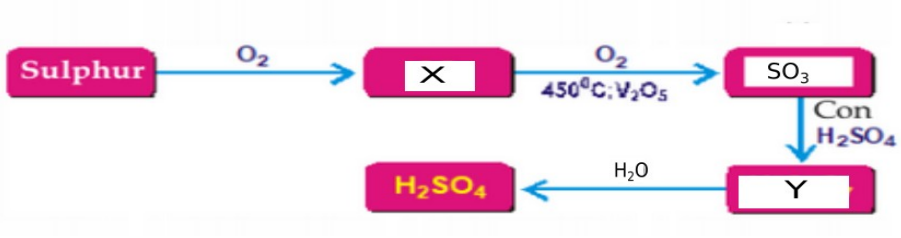
Pressure (P)	Volume (V)
2atm	12 L
4 atm	6 L
8 atm	3 L

a) What will be the volume of this gas at 1 atm pressure ? (1)

b) Which is the gas law related to this ? (1)

B. Answer any one question from 11 to 12. Each carries 2 scores. **(1 x 2 = 2)**

11. Complete the flow chart given below.



a) Identify X and Y. (1)

b) Which is the catalyst used in this process? (1)

12. a) Complete the equation.

$CH_3 - CH_2 - OH + CH_3COOH \longrightarrow$ ---------- $+H_2O$ (1)

b) To which category of organic compounds does the product of the above reaction belong ? (1)

PART III

A. Answer any three questions from 13 to 16. Each carries 3 scores. **(3 x 3 = 9)**

13. Haematite is converted into iron by using the blast furnace.

a) Which are the substance fed into the blast furnace along with the ore of iron? (1)

b) which compound act as the reducing agent in the blast furnace ? (1)

c) How does calcium oxide, the flux,formed in the furnace? (1)

14. a) Which are the chemicals required for the preparation of ammonia in the laboratory? (1)

b) Which is the drying agent used to remove moisture from ammonia ? (1)

c) The gas jar used for collecting ammonia is kept inverted. Why? (1)

15. An iron nail is dipped in $CuSO_4$ solution (Reactivity order Fe > Cu)

a) Which ion is responsible for the colour of the solution? (1)

b) What is the change that can be noticed on the iron nail after a while? (1)

c) Write down the chemical equation of the oxidation reaction occurs here? (1)

16. A compound of manganese is Mn_2O_3.

a) What is the oxidation state of Mn in Mn_2O_3. (1)

b) Give reason for the variable oxidation state of d block elements. (2)

B. Answer the following question. carries 3 scores. **(1 x 3 =3)**

17. NH_3 is a gas kept at STP.

a) What is the volume of 1 mol NH_3 gas at STP? (1)

b) How many moles are present in 112L of NH_3 gas at STP? (1)

c) How many molecules are present in this much amount of NH_3? (1)

PART IV

A. Answer any two questions from 18 to 20. Each carries 4 scores. **(2 x 4 = 8)**

18. The given table is related to different type reactions of hydrocarbons. Fill in the blanks. (4)

$CH_4 +$ a	$\longrightarrow$	$CO_2 + H_2O$
$CH_4 + Cl_2$	$\longrightarrow$	b $+ HCl$
c $+ H_2$	$\longrightarrow$	$CH_3 - CH_3$

$CH_3\text{-}CH_2\text{-}CH_3 \longrightarrow CH_4 +$ d

19. The subshell electronic configuration of an element X is [Ar] $3d^8\ 4s^2$.
    a) How many shells are there in an atom of this element? (1)
    b) The last electron filling occurs in which subshell? (1)
    c) Find the group number and period number of this element. (2)

20. Two reversible reactions at equilibrium are given below.
    $H_{2\,(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$
    $N_{2\,(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
    a) On which of this reactions does the pressure has no effect ? Give reason. (2)
    b) How does the following conditions affect a reversible reaction.
    i) More reactants are added. (1)
    ii) Products are removed. (1)

B. Answer any one question from 21 to 22. Each carries 4 scores. (1 x 4 = 4)

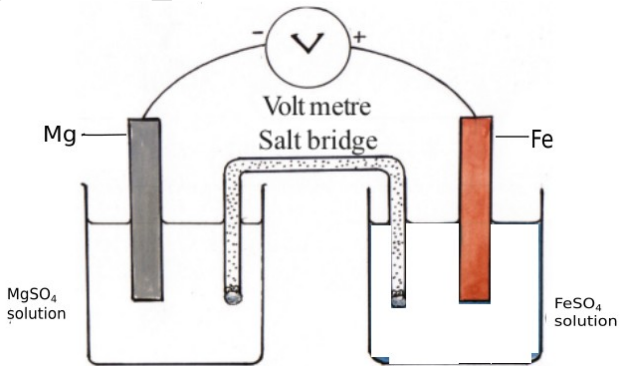
21. Alumina is mixed with cryolite and subjected to electrolysis to extract aluminium?
    a) Write the chemical formula of alumina. (1)
    b) Why cryolite is added to alumina? (1)
    c) Which are the ions present in alumina? (1)
    d) Write the equation of the reduction reaction taking place at negative electrode. (1)

22. The structure of two organic compounds are given below.
    i) $CH_3 - CH_2 - CH2 - CH_2 - OH$
    ii) $CH_3 - CH_2 - O - CH_2 - CH_3$
    a) Write the molecular formula of these compounds. (1)
    b) Which type of isomerism do they exhibit ? (1)
    c) Write the structural formula and IUPAC name of a position isomer of compound (i) (2)

PART V

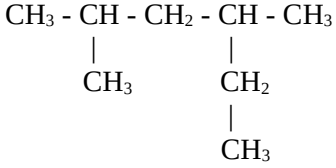
A. Answer any one question from 23 to 24. carries 5 scores. (1 x 5 = 5)

23.



A Galvanic cell is represented above
    a) What is the energy transformation in this cell? (1)
    b) At which metal electrode does oxidation take place? (1)
    c) From which metal to which metal do the electrons flow? (1)
    d) Which metal acts as the cathode? (1)
    e) Write down the equation showing the redox reaction taking place in the cell. (1)

[Hint: Reactivity Mg > Fe]

24. 

a) To which category does this compound belong? (1)
(Alkane, Alkene, Alkyne)

b) How many carbon atoms are there in the main chain of this compound? (1)

c) Name the branches present. (1)

d) Write the position numbers of the branches. (1)

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