

**MALAPPURAM DISTRICT HIGHER SECONDARY CHEMISTRY
TEACHERS ASSOCIATION**

OXYCHEMISTRY 3.0

FIRST YEAR CHEMISTRY MODEL EXAMINATION 3.1

Time :2 Hour

Cool off time : 20 Minutes

Maximum Score: 60

- ☐ *There is a cool off time of 20 minutes in addition to the writing time.*
- ☐ *Read questions carefully before answering.*
- ☐ *Calculations, figures and graphs should be shown in the answer sheet itself.*

Answer any 6 questions from 1-12. Each carries 2 scores (6x2=12)

1. Define 1 amu. (2)
2. There are many atomic models (2)
 - a) Who proposed nuclear model of atom. (1)
 - b) Give one limitation of the above model. (1)
3. State modern periodic law. (2)
4. VSEPR theory gives idea about shape of molecules (2)
 - a) The geometry of H₂O molecule is..... (1)
 - b) Give an example for a molecule having octahedral geometry. (1)
5. Define Boyle Temperature. (2)
6. What you mean by an isolated system? Give an example. (2)
7. Write the expression for K_c of the following reactions. (2)
 - a) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
 - b) $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$
8. Write any two limitations of octet rule. (2)
9. State Dalton's law of partial pressure. (2)
10. Define entropy and give its unit. (2)
11. Give the Arrhenius concept of acid and base. (2)
12. Calculate the number of molecules present in 88g CO₂. (2)

Answer any 8 questions from 13-28. Each carries 3 scores (8x3=24)

13. The combination of elements is based on laws of chemical combination.

- a) Who proposed law of definite proportion? (1)
- b) State the above law. (2)
14. Atomic orbitals are distinguished by quantum numbers. (2)
- a) Name the four quantum numbers. (2)
- b) Represent the orbital $n=1$ and $l=0$ (1)
15. Write any two factors affecting ionization enthalpy. (3)
16. Polarity is related to shape of molecules
- a) Define dipole moment. (2)
- b) What is the dipole moment of BeCl_2 molecule? (1)
17. Write the modified form of ideal gas equation applicable to all gases and explain each terms. (3)
18. The spontaneity of a process is explained in terms of change in free energy.
- a) What is meant by Gibbs free energy? (2)
- b) How standard free energy change is related to equilibrium constant. (1)
19. Le Chatelier principle is related to an equilibrium system
- a) State the above principle. (2)
- b) What is the effect of pressure in the equilibrium system
 $\text{H}_{2(g)} + \text{I}_{2(g)} \rightleftharpoons 2\text{HI}_{(g)}$ (1)
20. Mole concept help to determine the number of particles.
- a) Define 1 mole. (1)
- b) Calculate the number of moles present in 224L ammonia at STP. (2)
21. State Heisenberg's uncertainty principle and give its mathematical expression. (3)
22. Electronegativity is a periodic property
- a) What you mean by electronegativity? (2)
- b) Which element shows highest electronegativity? (1)
23. Write the molecular orbital configuration of O_2 molecule and give its magnetic behavior. (3)
24. Write any three postulates of kinetic molecular theory of gases (3)
25. Give the differences between exothermic reactions and endothermic reactions. (3)
26. There are different types of acid base concepts. Briefly explain Lewis concept of acid and base with examples. (3)
27. A photon has mass of 8.6×10^{-30} Kg. Calculate its wave length
 $[h=6.626 \times 10^{-34} \text{ Js}]$ (3)
28. Compare the dipole moment of NH_3 and NF_3 . (3)

Answer any 6 questions from 29-40. Each carries 4 scores each. (6x4=24)

29. Limiting Reactant is a term related to stoichiometry of equation.

a) What is meant by Limiting Reactant? (2)

b) Identify the limiting reactant when 500g $\text{SO}_{2(g)}$ react with 200g $\text{O}_{2(g)}$ based on the equation $2\text{SO}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{SO}_{3(g)}$ (2)

30. Atomic spectrum is helpful for the structural studies

a) Name the series of lines found in hydrogen spectrum. (2)

b) Calculate the wave Number of second line in Balmer series of hydrogen spectrum. (2)

31. Atoms can lose or gain electrons to get stability

a) What you mean by an isoelectronic species? (2)

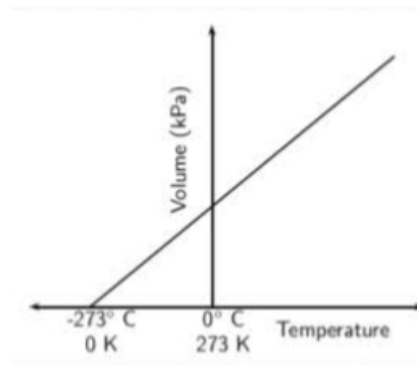
b) Arrange the following isoelectronic species based on their ionic radius. Na^+ , Mg^{2+} , O^{2-} , F^- (2)

32. Hybridisation is the factor which determine geometry of molecule.

a) Define hybridisation. (2)

b) Find out the hybridisation of H_2O and SF_6 . (2)

33. Consider the following graph.



a) Identify the gas law represented by the above graph. (1)

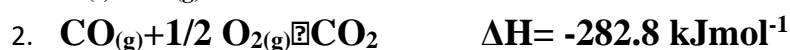
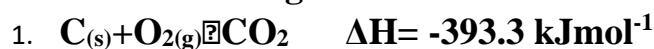
b) State the law. (2)

c) What you mean by absolute zero? (1)

34. Enthalpy is an extensive property.

a) Give the difference between extensive properties and intensive properties. (2)

b) Calculate the enthalpy formation of carbon monoxide (CO) from the following data (2)



35. Buffer Solutions are commonly used in laboratory

a) What you mean by buffer solutions? (2)

b) Give any two examples of buffer solutions. (2)

- 36. Electronic configuration is based on some rules and principles.**
- a) Briefly explain Hund's rule of maximum multiplicity with example. (2)
 - b) Write the stable electronic configuration of Cu and Cr. (2)
- 37. pH scale is used to identify whether a solution is acidic or basic.**
- a) Define pH scale. (2)
 - b) Calculate the pH of a soft drink containing H^+ ion concentration of 3×10^{-3} M. (2)
- 38. Chemical bond formation gives stability to a molecule**
- a) Write two differences between sigma bond and pi bond. (2)
 - b) Define Bond order. (2)
- 39. Weak electrolytes are partially ionisable.**
- a) Give an example for a weak electrolyte. (1)
 - b) Briefly explain common ion effect with example. (3)
- 40. We can predict the spontaneity of the reaction from free energy change.**
- a) What you mean by a spontaneous process? Give an example. (2)
 - b) The enthalpy and entropy changes of a reaction are $40.63 \text{ kJ mol}^{-1}$ and $108.8 \text{ JK}^{-1} \text{ mol}^{-1}$ respectively. Predict the feasibility or spontaneity of the reaction at 27°C . (2)