

# BOARD OF INTERMEDIATE EDUCATION, KARACHI

## H.S.C. Annual Examinations 2021

### (MODEL QUESTION PAPER)

### CHEMISTRY PAPER-I

Total Duration: 02 Hours

Total Marks: 85

### SECTION "A" (M.C.Qs)

Marks: 43

**Note:** This section consists of 43 questions. Attempt all M.C.Qs. Each carries 01 marks.

**Q1. Choose the correct answers for each from the given options:**

- Rain drops have spherical shape because a sphere has the least
  - ◆ Area
  - ◆ Length
  - ◆ Volume
  - ◆ Surface to volume ratio
- The quantities relationship between the substances according to balance equation describes:
  - ❖ Reversible reaction
  - ❖ Limiting reactant
  - ❖ Stoichiometry
  - ❖ Percentage compound
- 870.0 have
  - ❖ Two significant figures
  - ❖ Four significant figures
  - ❖ Three significant figures
  - ❖ Five significant figures
- The no. of orbitals in a shell can be determined by the formula
  - ❖  $(2l+1)$
  - ❖  $n^2$
  - ❖  $2(2l+1)$
  - ❖  $2n^2$
- $S^{-2}$  (Z=16) is isoelectronic with
  - ❖  ${}_{11}Na^{+1}$
  - ❖  ${}_{19}K^{+1}$
  - ❖  ${}_{9}F^{-1}$
  - ❖  ${}_{13}Al^{+3}$
- The most of the radiations coming out from pitch blend were
  - ❖ Electron
  - ❖ X-rays
  - ❖ Proton
  - ❖ Neutron

7. The bonds present in ethene ( $C_2H_4$ ) molecule

- ❖ Five  $\sigma$  bond and one  $\pi$  bond
- ❖ Three  $\sigma$  bonds and two  $\pi$  bonds
- ❖ Two  $\sigma$  bond and two  $\pi$  bond
- ❖ All  $\sigma$  bonds

8. Which molecule has linear structure:

- ❖  $CH_4$
- ❖  $NH_3$
- ❖  $BF_3$
- ❖  $C_2H_2$

9. Ice floats on top of water because its density is

- ❖ Lesser than density of water
- ❖ Greater than density of water
- ❖ Equal to density of water
- ❖ All of them

10. Heat absorbed by a system when its volume does not change is equal to

- ❖ Internal energy
- ❖ Increase in internal energy
- ❖ Work done by a system
- ❖ Change in enthalpy of system

11. Which of the following is intensive property of system?

- ❖ Density
- ❖ Volume
- ❖ Energy
- ❖ Entropy

12. The product of pressure and volume, PV has the dimension

- ❖ Pressure
- ❖ Energy
- ❖ Volume
- ❖ Temperature

13. For the reaction  $2NH_3 \rightleftharpoons N_2 + 3H_2$  the relationship between  $K_c$  and  $K_p$

- ❖  $K_c > K_p$
- ❖  $K_p = K_c$
- ❖  $K_c < K_p$
- ❖  $K_p = \frac{K_c}{2}$

14. Given the equilibrium the  $PCl_5 \rightleftharpoons PCl_3 + Cl_2$   $\Delta H = +ve$   
concentration of  $Cl_2$  at equilibrium will be increased by

- ❖ Lowering of temperature
- ❖ Adding  $PCl_5$  to mixture
- ❖ Adding  $PCl_3$  to the mixture
- ❖ Increasing pressure

15. Which one of the following solution is basic

- ❖  $\text{NH}_4\text{Cl}$
- ❖  $\text{Na}_2\text{CO}_3$
- ❖  $\text{NaCl}$
- ❖  $\text{KCl}$

16. The oxidation number of Cr in  $\text{Cr}_2\text{O}_7^{-2}$

- ❖ +3
- ❖ +12
- ❖ +6
- ❖ -2

17. The properties of solution which depends upon the no. of particles of solute are called

- ❖ Colligative properties
- ❖ Qualitative properties
- ❖ Intensive properties
- ❖ Physical properties

18. If the rate of reaction is independent of concentration of the reactant the reaction is of

- ❖ Zero order
- ❖ 2<sup>nd</sup> order
- ❖ 1<sup>st</sup> order
- ❖ 3<sup>rd</sup> order

19. A catalyst is a substance which increase the rate of reaction of chemical reaction, because

- ❖ It increases the temperature
- ❖ It changes the rate constant
- ❖ It increases pressure
- ❖ It lowers the activation energy

20. The branch of chemistry which deals with the study of reaction rates is known as

- ❖ Photochemistry
- ❖ Thermodynamics
- ❖ Chemical kinetics
- ❖ Electrochemistry

21. The penetration power of  $\beta$ -particle in air as compare to  $\alpha$ -particle is

- ❖ 100 times
- ❖ 1000 times
- ❖ 2 time
- ❖ 200 times

22. A gas at zero kelvin:

- ❖ Is super cooled
- ❖ freezes
- ❖ liquefies
- ❖ has zero volume

23. The molecular formula of vitamin C is  $\text{C}_6\text{H}_8\text{O}_6$ , Its Empirical formula is:

- ❖  $\text{C}_2\text{H}_3\text{O}_2$
- ❖  $\text{C}_3\text{H}_4\text{O}_3$
- ❖  $\text{CH}_2\text{O}$
- ❖  $\text{CHO}_2$

24. E+PV is called:

- ❖ Entropy
- ❖ Enthalpy
- ❖ Free Energy
- ❖ Internal Energy

25. The quantum number values for 3p orbitals are:

- ❖  $n=2, l=1,$
- ❖  $n=3, l=0,$
- ❖  $n=2, l=2,$
- ❖  $n=3, l=1,$

26. Orbitals having same energy are called:

- ❖ Hybrid orbitals
- ❖ Valence orbitals
- ❖ Degenerate orbitals
- ❖ Bonding orbitals

27. The net enthalpy change in a chemical reaction is same, whether it is brought about in two or more different ways in one or several steps. It is known as:

- ❖ Henry's Law
- ❖ Joule's Principle
- ❖ Hess's Law
- ❖ Law of Conservation of energy

28. Which of the following compound does not contain hydrogen bonding

- ❖  $\text{CH}_4$
- ❖  $\text{H}_2\text{O}$
- ❖  $\text{NH}_3$
- ❖ HF

29. In a chemical reaction equilibrium is said to have established when:

- ❖ Concentration of Products and reactants are equal.
- ❖ Rate of Opposing reaction become equal
- ❖ Opposing reaction cease
- ❖ Rate of forward reaction is twice as compare to reverse reaction.

30. Which of the following molecules has the largest bond angle:

- ❖  $\text{H}_2\text{O}$
- ❖  $\text{NH}_3$
- ❖  $\text{CH}_4$
- ❖  $\text{BeCl}_2$

31. The value of R (general gas constant) in S.I Unit is

- ❖ 8.3143 N.m/K.mole
- ❖ 8.3143 N.m/°C.mole
- ❖ 0.0821 N.m/°C.mole
- ❖ 0.0821 N.m/K.n

32. Bohr's Atomic model is contradicted by:

- ❖ Planck's Quantum Theory
- ❖ Chadwick Experiment
- ❖ Heisenberg uncertainty Principle
- ❖ Faraday's Law

33. The  $e/m$  value of electron is :

- ❖  $1.758 \times 10^8 \text{ } c/g$
- ❖  $0.000550 \text{ } c/g$
- ❖  $1.008 \text{ } c/g$
- ❖  $9.11 \times 10^{-28} \text{ } c/g$

34. The reaction which involves both oxidation and reduction is called:

- ❖ Addition reaction
- ❖ Redox reaction
- ❖ Elimination reaction
- ❖ Substitution reaction.

35. The rate of reaction

- ❖ Increases as the reaction proceeds
- ❖ Decreases as the reaction proceeds
- ❖ Remain the same as the reaction proceed
- ❖ May decrease or increase as the reaction proceed

36. For gaseous system, the value of  $K_p$  and  $K_c$  are same when:

- ❖ Reaction occurs at S.T.P
- ❖ Reaction is endothermic
- ❖ reaction is exothermic
- ❖ No. of moles of products are equal to N moles of reactant.

37. Heat absorbed or released during a chemical process at constant pressure is equal to:

- ❖  $\Delta E$
- ❖  $\Delta H$
- ❖  $q$
- ❖  $W$

38. Which of the following molecules has two  $\pi$  bond:

- ❖  $\text{CH}_4$
- ❖  $\text{C}_2\text{H}_4$
- ❖  $\text{N}_2$
- ❖  $\text{O}_2$

39. No two electrons in an atom can have a same set of four quantum number is called

- ❖ Newton's first law
- ❖ Hund's Rule
- ❖ Pauli Exclusion Principle
- ❖ Aufbau rule

40. Alpha rays are

- ❖ Neutron
- ❖ Electron
- ❖ Proton
- ❖ Helium Nuclei

41. The surface tension of liquid is independent of:

- ❖ Temperature
- ❖ Intermolecular forces
- ❖ Nature of Liquid
- ❖ Amount of Liquid

42. The tendency of liquid to cling together is called:

- ❖ Surface Tension                      ❖ Cohesion                      ❖ Adhesion                      ❖ Viscosity

43. The No of waves travel per one centimeter distance is :

- ❖ Wavelength                      ❖ wave no.                      ❖ wave function                      ❖ frequency

### Section 'B' (Short Answer Questions)

**Note: Attempt any five part questions.**

**(Marks = 25)**

**Q2. (i)** 1.367g of an organic compound containing C, H and O was combusted in a stream of air yield 3.002g CO<sub>2</sub> and 1.64g H<sub>2</sub>O. what is the empirical formula.

(ii) Define the following.

- \* Significant figure      \* System      \* Viscosity      \* Gay-Lussac Law

(iii) State Boyle's Law, Charles's law and prove them in term of Kinetic Molecular Theory.

(iv) Write down the electronic configuration for ground states of each of the following.

- \* Cl (Z = 17)                      \* Ca<sup>+2</sup> (Z = 20)      \* Fe (Z = 26)      \* N<sup>3-</sup> (Z = 7)

(v) Differentiate between the following (write only two differences for each).

- \* Sigma and Pi bond                      \* Hydration and Hydrolysis

(vi) The ratio of rates of diffusion of two gasses A and B is 1.5:1. If the relative molecular mass of gas A is 16, find out the relative molecular mass of gas B.

(vii) State First Law of Thermodynamic. In a certain process, 500 J of work is done on a system which gives off 200 J of heat. What is the value of change in Internal energy for the process.

(viii) Explain the effects of surface area and concentration of reactant on the rate of reaction.

(ix) Define Dipole moment. Why dipole moment of CO<sub>2</sub> and CCl<sub>4</sub> is zero.

(x) Predict the effect of increase in temperature and pressure on the following system at equilibrium state (only predict the direction)



**SECTION "C" (DETAILED-ANSWER QUESTIONS)** (Max Marks: 17)

**Note:** Attempt any one questions from this section.

**Q3 (a)** Write the postulates of Bohr's atomic. Derive the formula for the radius of nth orbit of hydrogen atom by using Bohr's atomic model. (9)

**(b)** Write the postulates of electron pair repulsion theory. Explain the shape of the H<sub>2</sub>O and NH<sub>3</sub> on the basis of electron pair repulsion theory. (8)

**Q4 (a)** Define oxidation and reduction. Balance the given equations by ION electron method. (9)



**(b)** Explain Arrhenius theory of ionization in detail. Also define indicator with two examples. (8)

**Q5 (a)** what are cathode rays? Give the properties of cathode rays and conclusion drawn about the structure of the atom from this experiment. Also define the construction of discharge tube. (9)

**(b)** How K<sub>c</sub> is used to predict the extent of a reversible reaction? Calculate the number of moles of Cl<sub>2</sub> produced at equilibrium when one mole of PCl<sub>5</sub> is heated at 250°C in vessel having a capacity of 10dm<sup>3</sup> (K<sub>c</sub>=0.041) (8)

