BOARD OF INTERMEDIATE EDUCATION, KARACHI

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CHEMISTRY PAPER-I
(MODEL PAPER)
Annual Examination 2021

Total time: 2 hours (Total Marks: 85)

Time: 30 min **Section 'A' (M.C.Qs (Multiple Choice Question)** Marks: 43

Note: This section consists of 43 questions. Attempt all M.C.Qs. Each carries 1 marks.

Q 1: Choose the correct answers for each from the given options:

1. Rain drops have spherical shape because a sphere has the least
   - ❖ Area
   - ❖ Volume
   - ❖ Length
   - ❖ Surface to volume ratio
2. The quantities relationship between the substances according to balance equation describes:
   - ❖ Reversible reaction
   - ❖ Stoichiometry
   - ❖ Limiting reactant
   - ❖ Percentage compound
3. 870.0 have
   - ❖ Two significant figures
   - ❖ Three significant figures
   - ❖ Four significant figures
   - ❖ Five significant figures
4. The no. of orbitals in a shell can be determined by the formula
   - ❖ (2l+1)
   - ❖ 2(2l+1)
   - ❖ n^2
   - ❖ $2n^2$
5. S^{-2} (Z=16) is isoelectronic with
   - ❖ $_{11}Na^{+1}$
   - ❖ $_{9}F^{-1}$
   - ❖ $_{19}K^{+1}$
   - ❖ $_{9}F^{-9}$
6. The most of the radiations coming out from pitch blend were
   - ❖ Electron
   - ❖ Proton
   - ❖ X-rays
   - ❖ Neutron
7. The bonds present in ethene (C_2H_4) molecule
   - ❖ Five σbond and one π bond
   - ❖ Two σ bond and two π bond
   - ❖ Three σ bonds and two π bonds
   - ❖ All σ 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
   - ❖ Equal to density of water
   - ❖ Greater than density of water
   - ❖ All of them
10. Heat absorbed by a system when its volume does not change is equal to
    - ❖ Internal energy
    - ❖ Work done by a system
    - ❖ Increase in internal energy
    - ❖ Change in enthalpy of system
11. Which of the following is intensive property of system?
    - ❖ Density
    - ❖ Energy
    - ❖ Volume
    - ❖ Entropy
12. The product of pressure and volume, PV has the dimension

❖ Pressure
❖ Volume
❖ Energy
❖ Temperature

13. For the reaction $2NH_3 \leftrightarrow N_2 + 3H_2$ the relationship between Kc and Kp

❖ Kc>Kp
❖ Kc<Kp
❖ Kp=Kc
❖ $Kp = \frac{Kc}{2}$

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

❖ Lowering of temperature
❖ Adding PCl_3 to the mixture
❖ Adding PCl5 to mixture
❖ Increasing pressure

15. Which one of the following solution is basic

❖ NH_4Cl
❖ NaCl
❖ Na_2CO_3
❖ KCl

16. The oxidation number of Cr in $\mathbf{Cr_2O_7^{-2}}$

❖ +3
❖ +6
❖ +12
❖ -2

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

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

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

❖ Zero order
❖ 1st order
❖ 2nd order
❖ 3rd order

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

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

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

❖ Photochemistry
❖ Chemical kinetics
❖ Thermodynamics
❖ Electrochemistry

21. The penetration power of β-particle in air as compare to α-particle is

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

22. A gas at zero kelvin:

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

23. The molecular formula of vitamin C is $C_6H_8O_6$, Its Emperical formula is:

❖ $C_2H_3O_2$ ❖ $C_3H_4O_3$ ❖ CH_2O ❖ 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
❖ Degenerate orbitals
❖ Valence orbitals
❖ Bonding orbitals

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

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

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

❖ CH_4 ❖ H_2O ❖ NH_3 ❖ HF

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

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

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

❖ H_2O ❖ NH_3 ❖ CH_4 ❖ $BeCl_2$

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.m

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 :

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

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
❖ Remain the same as the reaction proceed
❖ Decreases as the reaction proceeds
❖ May decreases or increases 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 exothermic
❖ Reaction is endothermic
❖ No. of moles of products are equal to No. of moles of reactant.

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

❖ ΔE ❖ ΔH ❖ q ❖ W

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

❖ CH_4 ❖ C_2H_4 ❖ N_2 ❖ O_2

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

❖ Newton's first law
❖ Pauli Exclusion Principle
❖ Hund's Rule
❖ 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 ❖ waveno. ❖ wave function ❖ frequency

Time:1 hour 30 min. Max. Marks: 42

Section 'B' (Short Answer Questions)

Note: Attempt any six part questions. (Marks = 24)

Q2: (i) 1.367g of an organic compound containing C, H and O was combusted in a stream of air yield 3.002g CO_2 and 1.64g H_2O. what is the empirical formula.

(ii) Define the following.

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

(iii) Calculate the volume of Oxygen gas at 17°C and 800 torr that may be obtained by complete decomposition of 50.5 g of KNO_3.

$$2KNO_3 \longrightarrow 2KNO_2 + O_2$$

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

* Cl (Z = 17) * Ca^{+2} (Z = 20) * Fe (Z = 26) * N^{-3} (Z = 7)

(v) Differentiate between the following.

* 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_2 and CCl_4 is zero.

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

* $N_2 + 3H_2 \leftrightarrow 2NH_3$ + Heat * $N_2 + O_2$ + Heat $\leftrightarrow 2NO$

SECTION 'C' (Detailed-Answer Questions)

Max, Marks: 18

NOTE: Attempt any one questions from this section.

Q3- (a) Derive the formula for the radius of nth orbit of hydrogen atom by using Bohr's atomic model. (6)

(b) Write the postulates of electron pair repulsion theory. Explain the shape of theH_2O on the basis of electron pair repulsion theory. (6)

(c) Balance the given equations by ION electron method. (6)

* $Cl_2 + OH^{-1} \rightarrow Cl^{-1} + ClO_3^{-1} + H_2O$ (Basic)
* $MnO_4^{-1} + SO_3^{-2} \rightarrow MnO_2 + SO_4^{-2}$ (Acidic)

Q4. (a) Explain Arrhenius theory of ionization in detail. (6)

(b) what are cathode rays? Give the properties of cathode rays and conclusion drawn about the structure of the atom from this experiment.

(6)

(c) Calculate the number of moles of Cl_2 produced at equilibrium when one mole of PCl_5 is heated at 250℃ in vessel having a capacity of $10dm^3$ (Kc=0.041) (6)

$$PCl_5 \leftrightarrow PCl_3 + Cl_2$$