PUBLIC CHEMISTRY QUESTION BANK 1.0

STD: XI

2 Marks

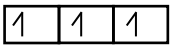
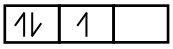
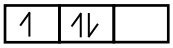
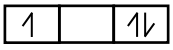
UNIT 1: BASIC CONCEPTS OF CHEMISTRY AND CHEMICAL CALCULATIONS

1. Define Relative Atomic Mass.
2. Define Equivalent Mass.
3. What is the empirical formula for the following?
   i) Fructose ($C_6H_{12}O_6$) found in honey
   ii) Caffeine ($C_8H_{10}N_4O_2$) a substance found in tea and coffee.
4. Calculate the amount of water produced by combustion of 32g of methane.
5. How many moles of hydrogen is required to produce 10 moles of ammonia?
6. Write the electronic concept of oxidation and Reduction.
7. Calculate the oxidation state of oxygen in H_2O_2 and KO_2
8. Calculate the oxidation number of carbon in CH_2F.
9. Define Limiting reagent.
10. What do you understand by the term 'mole'?

UNIT 2: QUANTUM MECHANICAL MODEL OF ATOM

1. Define Orbital. Whare are the n and l values for $3px$ and $4d_{x^2-y^2}$ electron?
2. State Pauli's exclusion principle.
3. Give the electronic configuration of Mn^{2+} and Cr^{3+}.
4. How fast mut a 54g tennis ball travel in order to have de Broglie wavelength that is equal to that of a photon of green light 5400Å?
5. What is the de Broglie wavelength of an electron which is accelerated from the rest through a potential difference of 100V?
6. Calculate the uncertainity in position of an electron, if the uncertainity in its velocity is $5.7 \times 10^5 ms^{-1}$.
7. State Heisenberg uncertaintiy principle.

8. Calculate the total number of angular nodes and radial nodes present in 3d and 4f orbitals.
9. Calculate the de-Broglie wavelength of a particle whose momentum is $66.26 \times 10^{-28}\ kg\ ms^{-1}$.
10. Consider the following electronic arrangement for p^3 configuration.

a)  b)  c)  d) 

11. Write the descending order of e^{θ} releasing tendency of Zn, Cu and Ag metals. Arrange the metals Zn, Cu and Ag in the descending order of their effective nuclear charge.

UNIT 3: PERIODIC CLASSIFICATION OF ELEMENTS

1. State Modern Periodic law.
2. What are isoelectronic ions? Give examples.
3. Is the definition given below for ionization enthalpy correct?
   "Ionisation enthalpy is defined as the energy required to remove the most loosely bond electron from the valence shell of an atom".
4. Define Electronegativity.
5. Give the general configuration of Lanthanides and Actinides.
6. Define Valency. How is it determined?
7. Calculate the effective nuclear charge of Helium.
8. Atomic number of elements X,Y,Z and A are 4,8,7,12 respectively. Arrange them in the decreasing order of their electronegativity.
9. In what period and group will and element with Z=118 will be present?
10. Define Electron affinity.

UNIT 4: HYDROGEN

1. What is water gas shift reaction?
2. How is Tritium prepared?
3. What is ortho and para hydrogen?
4. Give the uses of heavy water/

5. NH_3 has exceptionally high melting point and boiling point as compared to those of hybrids of remaining element of group 15 Explain.
6. What is mean by intra molecular hydrogen bond? Give on example.
7. How does iron react with steam?
8. What is syn gas? How is it prepared?

UNIT 5: ALKALI AND ALKALINE EARTH METALS

1. Write the uses of Magnesium.
2. How is bleaching powder prepared?
3. Why do alkali metals give different colours when heated in Bunsen flame?
4. What are S-block elements?
5. Among the alkaline earth metals, BeO is insoluble in water but other oxides are soluble. Why?
6. How is plaster of Paris prepared?
7. Beryllium halides are covalent whereas Magnesium halides are ionic. Why?
8. Why are alkali metals harder than alkali Earth metals?
9. Be & N have Zero Electron Affinity. Why?

UNIT 6: GASEOUS STATE

1. State Boyle's Law.
2. State Charle's Law.
3. State Gray-Lussac's Law.
4. State Graham's law of diffusion
5. Can a Vander Wall gas with a=0 be liquified? Explain.
6. Write the Vander Waals equation for a real gas. Explain the correction term for pressure and volume.
7. State Dalton's law of partial pressures.
8. Give the expression for critical constants.
9. What is inversion temperature?

10. What is the density of N_2 gas at 227^oC and 5 atm pressure? ($R = 0.082\ L\ atm\ K^{-1}\ mol^{-1}$)
11. State Joule Thomson effect.
12. What is compressibility factor Z ?

UNIT 7: THERMODYNAMICS

1. What is Lattice Energy?
2. Give Kelvin Planck statement of second law of thermodynamics.
3. What are spontaneous reactions? What are the conditions for spontaneity of a process.
4. Calculate the entropy change during the melting of one mole of ice into water at 0^oC and 1 atm pressure. Enthalpy of fusion of ice is 6008 $J\ mol^{-1}$.
5. Calculate the standard entropy change for the following reaction $(\Delta S^o{}_f)$, given the standard entropies of $Co_2(g)$, C(s), $o_2(g)$ are 213.6, 5.740, 205 JK^{-1} respectively.
6. State the Zeroth law of thermodynamics.
7. Define molar heat capacity. Give its Unit.
8. The equilibrium constant of a reaction is 10, what will be the sign of ΔG? Will the reaction be spontaneous?
9. Give the relation between Enthalpy (H) and Internal Energy (U).
10. One mole of ideal gas is put through a series of changes as shown below in a cyclic process. Name the process $A \rightarrow B, B \rightarrow C, C \rightarrow A$.

UNIT 8: PHYSICAL AND CHEMICAL EQUILIBRIUM

1. If there is no change in concentration, why is the equilibrium state, considered dynamic?
2. State Le-Chatelier principle.
3. Write a balanced chemical equation for a equilibrium reaction for which the equilibrium constant is given by the expression $K_c = \frac{[NH_3]^4[o_2]^5}{[NO]^4[H_2o]^6}$
4. Define Reaction Quotient Q.

5. Write K_P and K_c for the following reaction

   $2H_2O(g) + 2Cl_2(g) \rightleftharpoons 4HCl(g) + O_2(g)$

6. Write a balanced Chemical equation for the $K_c = \frac{[CaO(S)][Co_2]}{[CaCO_3]}$

7. What is the relation between K_p and K_c? Give one example for which $K_p = K_c$

8. State Law of mass action.

9. What is the effect of addition of inert gas on the reaction at equilibrium at constant volume?

UNIT 9: SOLUTIONS

1. State Henry's Law.
2. Define Molality.
3. Define Normality.
4. Define isotonic solutions.
5. State Raoult's law.
6. A 0.25M glucose solution at 370.28K has approx the pressure as blood does what is the osmotic pressure of blood?
7. Define the term solubility.

UNIT 10: CHEMICAL BONDING

1. Define Bond Order and Bond Energy.
2. Define Hybridisation.
3. Linear form of Carbondioxide molecule has two polar bonds yet the molecule has Zero dipole moment. Why?
4. Which bond is stronger? σ or π? Why?
5. Which of the following has highest bond order? $N_2, N_2^+ \; or \; N_2^-$?
6. Draw the Lewis dot structure for nitric acid.
7. What is called Bond length? Name the techniques through which the length of a bond can be determined.
8. Write the shape and molecular geometry of BF_3.

9. Explain bond formation in $MgCl_2$.
10. Draw the Lewis Structure for NO_3^-, SO_4^{2-}.

UNIT 11: FUNDAMENTALS OF ORGANIC CHEMISTRY

1. Give the general characteristics of organic compounds.
2. Define Retention factor R_f.
3. Give an example for Benzenoid and Non-Benzenoid Compounds.
4. Give the structural formula for
   i) 3 – cyclo hexyl pentan – 2 – one.
   ii) 2 – ethyl but – 3 – enoic acid.
5. How do you detect the presence of Nitrogen and Sulphur together in an organic compound?
6. Write the IUPAC name / Molecular formula for the first four members of alcohol.
7. Which is the suitable method for the detection of Nitrogen present in food and fertilisers?
8. Define Isomerism.

UNIT 12: BASIC CONCEPT OF ORGANIC REACTIONS

1. Write the no bond resonance structure shown by propene.
2. What are Nucleophiles and Electrophiles? Give one example for each.
3. What is Homolytic and Heterolytic fission?
4. Write the general equation for organic reaction.

UNIT 13: HYDROCARBONS

1. What happens when isobutylene is treated with acidified potassium permanganate?
2. What happens when ethylene is passed through cold dilute alkaline potassium permanganate?
3. Write a note on Birch reduction.
4. Write Friedel – Craft's reaction.

5. Draw the staggered and eclipsed conformers of n-butane.
6. Is it possible to prepare methane by Kolbe's electrolytic method?
7. How propene is prepared from 1,2 – dichloro propane?
8. Complete the following: - ⁘

a) 2 – butyne $\xrightarrow{Lindlar\ catalyst}$

b) $CH_2 = CH_2$ $\xrightarrow{I_2}$

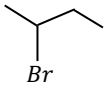
c) $\begin{matrix} CH_2 \\ | \\ Br \end{matrix} - \begin{matrix} CH_2 \\ | \\ Br \end{matrix}$ $\xrightarrow{Zn/C_2H_5OH}$

d) CaC_2 $\xrightarrow{H_2O}$

UNIT 14: HALOALKANES AND HALOARENES

1. Why chlorination of methane is not possible in dark conditions?
2. Which alkyl halide from the following pair is

i) Chiral ii) Undergoes faster S_{N^2} reaction?



3. Give reason for polarity of $C - X$ bond in halo alkane. ⁘
4. T – butyl chloride reacts with aqueous KOH by S_{N^1} Mechanism while n – butyl chloride reacts by S_{N^2} mechanism Give reason.
5. How is alkane prepared from Grignard Reagent?
6. Give the structure and uses of DDT. ⁘
7. Explain Williamson synthesis.
8. Why is it necessary to avoid even traces of moisture during the use of Grignard reagent?
9. How ill you prepare diethyl ether from ethyl bromide?
10. Write a note on Balz – Schiemann reaction.

UNIT 15: ENVIRONMENTAL CHEMISTRY

1. Define BOD.
2. What is Acid Rain?
3. What is Green Chemistry?
4. What are the various methods you suggest to protect our environment from pollution?
5. Define COD.

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