QUARTERLY EXAM MOST IMPORTANT QUESTIONS | 2023

1.BASIC CONCEPTS OF CHEMISTRY AND CHEMICAL CALCULATION.

MOST IMPORTANT QUESTIONS:

1.Define equivalent mass ? Q-19 B/B-28
2. Define relative atomic mass ? B/B-26
3. Distinguish between oxidation and reduction ? B/B-30 (H-19)
4. Calculate the molar mass of the following compounds. B/B-31
   i) urea [$CO(NH_2)_2$] ii) acetone [CH_3COCH_3]
   iii)Boric acid [H_3BO_3] iv) nitric acid [HNO_3]
5. What do you understand by the term mole ? (B/B- 27)(jun-2019)
6. How many moles of ethane is required to produce 44g of $CO_{2(g)}$ after.combustion ?(B/B- 40)
7. what is limiting reagents ? (Q-18) IN.P.NO : 17
8. Find out the equivalent weight of sulphuric acid .IN.P.NO : 9
9. Define – Oxidation number ? IN.P.NO :20 (H-18)
10. What is combination reaction ? Give an example . IN.P.NO :22
11. Define Avogadro number .(IN.P.NO : 7)
12.How many moles of hydrogen is required to produce 10 mole of ammonia ?
13. Explain the following redox –reactions.(IN.P.NO :22,23)
   i)Combination reactions ii)Decomposition reaction iii) Displacement reaction
14. What are auto redox reactions ? give an example. (jun-2019) (IN.P.NO : 23)
15. What is empirical formula of the following ? (IN.P.NO : 12)
a) acetic acid ($C_2H_4O_2$) b) Tartaric acid ($C_4H_6O_6$)
16. Calculate the molar mass of the following compounds CRT
i)H_2SO_4 ii) CH_3COOH
17. Define –i) amu ii)Relative molecular mass. iii)Molar mass. iv)Molar volume.
18. Mass of one atom of an element is 6.645 x 1023g. How many moles of element are there in 0.320 kg.
19.A compound contains 69.5% oxygen and 30.5% nitrogen and its vapour density is 46.calculate its empirical formula and molecular formula.
20.Calculate amount of moles of hydrogen required to prepare 10 mole ammonia ?
21.A compound on analysis gave the following percentage composition C=54.55%, H=9.09%,O=36.36% .Determine the empirical formula of compound.
22.An organic compound present in vinegar has 40% carbon , 66 % of hydrogen 53.4 % of oxygen. Find the empirical formula of compound. IN.P.NO :11
23.Calculate the empirical and molecular formula of a compound containing 76.6% carbon,6.38 % hydrogen and rest oxygen its vapour density is 47. B/B- 42
24.how many moles of ethane is required to produce 44g of CO_{2g} after combustion
25. Balance the equation by oxidation number method (B/B- 44)
26. Balance the following equation by ion electron method(B/B-45)

2.QUANTUM MECHANICAL MODEL OF ATOM

1.Describe the aufbau's principle. (B/B- 40) (H-19) ****
2.How many orbitals are possible for n=4 ? (B/B- 27) ****

3.state pauli exclusion principle . (B/B- 31) (M-19) (H-18) ****
4.Explain briefly the time independent schrodinger wave equation. (B/B- 33) Q-19
5.Give the electronic configuration of Mn2+ and Cr3+ . (B/B- 39) (Q-18) ****
6.Define orbital ? What are the n and l values 3px and ****
4dx2-y2 electron ? (B/B- 32)
7.How many radial nodes for 2s, 4p, 5d and 4f orbitals exhibit ?
how many angular nodes ? (B/B- 28) ****
8. Define orbital (Q-18).What are the n and l values for 3px and 4dx2-y2 electron ? (B/B-32)
9. What is exchange energy .Draw the possible exchange of electron in d5 orbital of chromium.(IN.P.NO : 56) ****
10. state heisenberg's uncertainity principle . (IN.P.NO : 42) ****
11. Explain the postulates of bohr's atomic model. (IN.P.NO :39) (H-19) (H-18)
12. Describe the hund's rule with suitable example. (IN.P.NO : 53) ****
13. Derive de-broglie equation. (IN.P.NO : 41) Q-19 (M-19)(Q-18)and gave its significance. ****
14. Explain the all quantum numbers. (IN.P.NO : 44) ****
15. Determine the values of all the four quantum number of the 8th electron in O-atom and 15th electron in Cl atom and the last electron in chromium.
16. Calculate the energy required for the process.
$He^+(g) \rightarrow He^{2+}(g) + e^-$
17. What is the de-Broglie wave length of an electron, which is accelerated from the rest, through a potential difference of 100V?
18. What is the de Broglie wavelength (in cm) of a 160g cricket ball travelling at 140 Km hr-1.
19. Calculate the uncertainty in the position of an electron, if the uncertainty in its velocity is 5.7 x 105 ms-1.
20. List out the limitations of Bohr's atom model.
21. 3. Define - Zeeman effect and Stark effect.
22. Define - Effective nuclear charge (Z*).

3.PERIODIC CLASSIFICATION OF ELEMENTS

1.Define modern periodic law ? (B/B-24)(Q-18) Q-19 (H-19) ****
2.What are isoelectronic ions ? give examples. (B/B-25) (H-18) Q-19 ****
3.Explain the diagonal relationship. (B/B-41) (M-19) Q-19 ****
4.Define electronegativity ? (B/B-29) ****
5.What is effective nuclear charge ? (B/B-26) ****
6. First ionisation energy of N-atom is greater than that of O-atom, give appropriate reason. (B/B-44i) (jun-2019) ****
7. Define the following i) ionisation energy ii) electron affinity (IN.P.NO: 84,86)
8. State and explain Dobereiner's "Triad". (IN.P.NO: 69) (M-19)
9. Define newland octat rule. (IN.P.NO : 70)
10. Magnesium loses electrons successively to form Mg+, Mg2+ and Mg3+ ions. Which step will have the highest ionisation energy and why ?
11. Calculate the ionic radii of Na+ and F- in NaF crystal. Where in ionic distance is 231 pm.

12. What is Screening effect?
13. Give the general electronic configuration of lanthanides and actinides.
14. By using pauling's method calculate the ionic radii of K+ Cl- ions in the potassium chloride crystal. Given that d K+-Cl- = 3.14Å.

4.HYDROGEN

1.Write a note on deuterium exchange reaction. (B/B-34) (Q-19) (Q-18)
2.What are isotopes ? write the names of isotopes of hydrogen . (B/B-32)
3.How to you convert para hydrogen into ortho hydrogen ? (H-18) (B/B-35)
4.Write the uses of heavy water. (Q-18) (B/B-33)
5. What are the three types of covalent hydrides ? (B/B-23)
6. Explain covalent hydride . How are they classified ? (B/B-23) (Q-18)
7.Write notes on interstitial hydrides. (Q-19) (IN.P.NO :113)
8.Why is hydrogen peroxide not stored in glass container ? (jun-2019) (IN.P.NO :112)
9.Write any three uses of hydrogen. (IN.P.NO :105)
10.What is hydrogen bond ? explain it's types with example. (Q-18) (H-18) (IN.P.NO :114)
11.Explain zeolite or permutit process. (IN.P.NO : 109)
12.Write the preparation of deuterium and tritium reaction (M-19) ? (IN.P.NO :104)
13.Explain the structure of hydrogen peroxide ? (IN.P.NO:112)
14.What is ortho and para hydrogen. (IN.P.NO: 102) (Q-18) Q-19
15.Explain the preparation of Hydrogen using electrolysis. (B/B-37)
16.Write any two uses of deuterium . (B/B-36)
17.Write the preparation of LiAlH4 and NaBH4.
18.What are Hydrated crystals? Give example.
19. What is Intramolecular hydrogen bond?
20.Compare the structure of H2O and H2O2.

6.GASEOUS STATE

1. Write the Boyle's law. (B/B-26) (Q-18) ****
2.Derive the values of vanderwaals equation constants in terms of critical constants. (B/B-41) ****
3.Can a vanderwaals gas with a=0 be liquefied ? explain. (B/B- 30) ****
4.What are ideal gases ? In what way real gases differ from ideal gases. (B/B-29) ****
5.Distinguish between diffusion and effusuion. (B/B-37) ****
6.Distinguish real gas and idal gases. (B/B-29) (H-18) ****
17.Give the expression of critical constants by using vander vaals constant. (B/B-41) ****
8.Explain the following observations. (B/B-32,a,c) ****
a) Aerated water bottles are kept under water during summer.
b) The tyre of an automobile is inflated to slightly lesser pressure in summer than in water.
9.What are ideal gases ? (B/B-29)(M-19) ****
10.Explain Andrew's isotherm of carbon di oxide . (IN.P.NO : 172) (H-18) ****
11.Define compressibility factor Z. (IN.P.NO : 169) (Q-18) (Q-19) ****
12.state Diffusion law. (IN.P.NO : 168) ****
13. 12.State Graham's diffusion law ? write its mathematical expression. (IN.P.NO : 168) (Q-19) (M-19) ****
14.Derive ideal gas equation. (IN.P.NO : 165) (jun-2019) (H-19) ****

15.Write the Charles law. (IN.P.NO : 162) (Q-18) ****
16.Write the Gay-Lussac's law. (IN.P.NO : 164) ****
17.What is Avogatro's hypothesis ?. (IN.P.NO : 165)
18.What is joule-Thomson effect. (IN.P.NO : 175) (Q-18) ****
19.What is inversion temperature ? (IN.P.NO : 175) (jun-2019) ****
20.Define Gay-Lussac's law (IN.P.NO : 164)
21.Define Absolute zero temperature (IN.P.NO : 164)
22.Derive the vander waals constant.(IN.P.NO : 172)
23. Textual Problems - 1 and 2 (In focus Page no 75)

7.THERMODYNAMICS

1. State - First law of thermodynamics.
3. Define - Isothermal process
4. Define - Adiabatic process
5. Define - Isobaric process
6. Define - Isochoric process
7. What is entropy? What are the units of entropy.
8. Define - Molar heat capacity.Give its unit .
9. What is Gibb's free energy?
10. Define - Enthalpy of combustion.
11. Define - Enthalpy of neutralisation.
12. What are state and path functions? Give example.
13. Define - The calorific value of food. What is the unit of calorific value?
14. State - Third law of thermodynamics.
15. State Various statement of second law of thermodynamics.
16. What are intensive properties? Give example.
17. What are Extensive properties? Give example.
18. Define - Clausius statement.
19. Write a note on Homogeneous and Heterogeneous system.
20. What is Internal energy (U)?
21.What is lattice energy ? (B/B-37)(Q-18) ****
22.Predict the feasibility of a reaction when (B/B-31) ****
a) Both ΔH and ΔS positive b) Both ΔH and ΔS negative c) ΔH decrease and ΔS increase
23.Define gibbs free energy . (B/B-32)
24.Give kelvin-plank statement of second law thermodynamics. (B/B-39) (Q-19) ****
25.Define Hess's law of constant heat summation. (B/B-27) (Q-18) Q-19 ****
27.Derive the relation between ΔH and ΔU for an ideal gas. (B/B-50) (Q-18) (H-18)
28.What are spontaneous reaction ? what are the condition for the spontaneity of a process ? (B/B-46)(H-19) ****
29.What are the characteristics of free energy ? (B/B-52)
30.What are the characteristics of internal energy ? (B/B-47) (H-19) ****
31.Show that $\Delta H=\Delta U + RT(\Delta ng)$ (B/B-50) ****
32.Define Third law of thermodynamics . (B/B- 42) (Q-18) (M-19) ****
33.Write the First law of thermodynamics . (B/B-26) (H-19
34.Derive the relationship between CP and CV for an ideal gas. (IN.P.NO : 201) Q-19
35.Give the application of Hess's law of constant heat summation. (IN.P.NO: 207)
36.State Zeroth law of thermodynamics. (IN.P.NO: 194) (Q-19)

37.State the various statement of second law of thermodynamics. (IN.P.NO: 210)
38.Calculate the entropy change during the melting of one mole of ice into water at 00C and 1 atm pressure .Enthalpy of fusion of ice is 6008 J mol-1 (IN.P.NO: 213)

8.PHYSICAL AND CHEMICAL EQUILIBRIUM

1. Define law of mass action . (B/B-34) ****
2. Define lechatlier's principle. (B/B-32) (M-19) ****
3. Derive vant hoff equation. (B/B: 49) ****
4. Derive relation between KP and KC . (B/B-39) ****
5.What is the effect of added inert gas on the reaction at equilibrium. (B/B: 38) (jun-2019)
6.What is the relation between KP and KC ? give one example for which KP is equal to KC. (B/B-28)
7.At a particular temperature KC = 4 x 10-2 for the reaction $H2S(g) \leftrightarrow H2(g) + 1/2S2(g)$ calculate KC for each of the following. (B/B:45)
i) $2H2S(g) \leftrightarrow 2H2(g) + S2(g)$ ii) $3H2S(g) \leftrightarrow 3H2(g) + 3/2S2(g)$
8.KC = [NH3]4 [O2]5 / [NO]4 [H2O]6 Write the balanced chemical equation for this equation.(B/B-37)
8. Compare Q and KC mention. (IN.P.NO: 11)
9. Define reaction quotient or Q. (IN.P.NO: 11) **
10.Define equilibrium constant. (IN.P.NO: 6)
11.Draw the KP and KC for the formation of HI. (IN.P.NO: 12) **
12.Draw the KP and KC for the formation of PCl5. (IN.P.NO: 13) **
13. Derive KP and KC for the formation of ammonia by haber's Process. (IN.P.NO: 14) *
14. Derive the equilibrium constant of KP and KC . (IN.P.NO: 6)
15.The equilibrium concentration of NH3 ,N2 and H2 are 1.8 x 10-2 M , 1.2 X 10-2 M and 3 X 10-2 M respectively . calculate the equilibrium constant for the formation of NH3 from N2 and H2. (IN.P.NO: 14)
16.What is the effect of pressure in the $N2 + 3H2 \leftrightarrow NH3$ equilibrium reaction. (IN.P.NO: 17)
17. State equilibrium constant (KC) ? . (IN.P.NO: 6)
18. Derive KC value for dissociation of PCl5 ? (IN.P.NO: 13) (H-19)
19. Why is chemical equilibrium considered dynamic in equilibrium ? (IN.P.NO: 5) (H-19)
20.Derive the relation between KP and KC for a general homogeneous gaseous reaction. (IN.P.NO: 5) (jun-2019)

11.FUNTAMENTALS OF ORGANIC CHEMISTRY

1.What is homologons series. (B/B-33) (H-19) ****
2.Classification of organic compounds based on structure with example. (B/B-32)
3.Write the characteristic of organic compound. (B/B-31) (H-19) ****
4.Briefly explain geometrical isomerism in alkene by considering 2-butene as an example. (B/B-46) ****
5.Explain column chromatography . (B/B:42ii) ****
6.Describe the reaction involved in the detection of nitrogen in an organic compound by lassaigne method. (B/B-40) ****
7. What is meant by functional group ? Identify the functional group of the following compounds. (B/B-34) i) acetaldehyde ii) oxalic acid iii) dimethyl ether iv) methyl amine v) Formic acid vi) methyl alcohol.
8.0.24gm of organic compound gave 0.287gm of AgCl in carius method .calculate the percentage of chlorine in the compound. (B/B-50)

9.Explain paper chromatography . (B/B-43) ****
10.0.30g of a substance gives 0.88g of carbon dioxide and 0.54g of water calculate the percentage of carbon and hydrogen. (B/B-47)
11.Explain Fractional distillation. (B/B-42i)
12.Which is the suitable method for detection of nitrogen present in food and fertilizers?(B/B-40)
13.Give the principle involved in the estimation of halogen in an organic compound by carius method. (B/B-41)
14.0.24g of an organic compound gave 0.287g of siver chloride in the carius method . calculate the percentage of chloride in the compound. (B/B-50)
1.What is sublimation ? give example . (IN.P.NO: 148)
2.What is isomerism ? (IN.P.NO:131)
3.Mention the various methods of chromatography. (IN.P.NO:151)
4. Draw cis-trans isomers for 2,3-dichloro-2-butene
5.What is meant by retention factor. (IN.P.NO:152)
6.Write notes on ring chain isomerism. (IN.P.NO:134)
7. Write the condition of optical isomerism. (IN.P.NO:137) ****
8.Explain functional isomerism with example. (IN.P.NO:133)
9.Give the structure of the following compounds (B/B-39)
i) 3-ethyl-2-methyl-1-pentane ii) 3-chlorobutanol iii) 1,5-dimethyl cyclohexane
iv) 2-methyl butan-1-ol v) 2-ethoxy propane vi) Acetaldehyde.
10.Give the structural formula for the following compounds.(IN.P.NO: 124EY) (M-19)
i) m-dinitrobenzene ii) p-dichlorobenzene iii) 1,3,5,Tri-methyl benzene
11.Identify the cis and trans isomers for the following compounds.(IN.P.NO: 135) (M-19)
i) (CH3)CH=C CH3 (H) ii) HC(CH3)=CH(CH3)
12.Write any two different compounds you get during fractional distillation of coal tar at any two different temperature. (M-19)
13.What are azeotropes. (IN.P.NO:150)
14.What do you mean by chromatography ? (IN.P.NO:150)
15.Write any five functional group with suitable example.(B/B-34)
16.What is the principle of chromatography ?. (IN.P.NO: 151)
17.In an estimation of sulphur by carius method 0.2175g of the substance gave 0.5825g of BaSO4 .calculate the percentage composition of sulphur in the compound. (IN.P.NO:142)
18.What are enantiomers ?. (IN.P.NO:137)
19.Give the condensed formula and bondline formula of 2,2,4-trimethyl pentane and 3,3,5-trimethyl heptane.
20.Trans isomers is more stable than cis isomer. Why ? (IN.P.NO:136) (H-18) ****
21. Give the structural formulae of the following compounds. (H-18)
i) 3-cyclohexyl pentan-2-one ii) 2-ethyl but -3-enoic acid
22. 0.2346g of an organic compound containing C,H and O an combustion gives 0.2574g of H2O and 0.4488g CO2 calculate the percentage composition of C,H, and O in the organic compound . (IN.P.NO:141)
23.Write the IUPAC name/molecular formula for the first four members of alcohol. (H-19)
24.Give an example for (IN.P.NO:112)i) benzenoid compound, non benzenoid compound(IN.P.NO : 113EY)(H-19)
ii) aromatic hetrocyclic compound. (IN.P.NO : 113EY)
25.Explain various types of constitutional isomerism (structural isomerism) in

organic chemistry. (IN.P.NO:132)
26.Explain- metamerism. (IN.P.NO:133) **
27.Explain lassaign sodium fusion test. (IN.P.NO: 138) **
28.Explain functional isomerism with example.(IN.P.NO: 133)
29.How will you detect the presence of sulphur in an organic compound ? (IN.P.NO: 139) (H-18)
30.How do you detect the presence of nitrogen and sulphur together in an organic compound ? (IN.P.NO:138) (jun-2019)
31.Explain a suitable method for purifying and separating liquids present in s mixture having very close boiling point. (fractional distillation)(IN.P.NO: 149) (jun-2019)
32.Explain cis, trans isomerism with example. (IN.P.NO:135) **
33.Explain kjedhals method for the estimation of nitrogen. (IN.P.NO:146)
34.Mention the various steps of crystallization.(IN.P.NO:148)
35.Why need for purification of organic compounds . (IN.P.NO:148)
36.Write the chemical equation a) Prussian blue b) sodium nitro prusside (IN.P.NO :139) *
37.Write a short note on thin layer chromatography(IN.P.NO: 152) **
12.BASIC CONCEPTS OF ORGANIC REACTION
1.what is nucleophile and electrophile with example. ? (M-19) (B/B-17) ****
2.Define electromeric effect. (B/B-20)
3. Give examples for the following types of organic reactions. (B/B-21)
i) β-elimination reaction **** ii) electrophilic substitution.
4. Write short notes on i) resonance ii) hyper conjugation with example. (B/B-16)
5. Explain inductive effect with example. (B/B-19) (H-19) (jun-2019) ****
BOOK INSIDE QUESTIONS :
1.Write the oxidation and reduction reaction. (IN.P.NO: 173)
2. Compare nucleophile and electrophile. (IN.P.NO: 164) ****
3.What is free radical ? give example (IN.P.NO: 162)
4.Draw the shape of carbocation, carbanion and free radical. (IN.P.NO: 163)
5.Write the free radical addition reaction. (IN.P.NO: 172)
6.What happens when nitriles undergo and hydrolysis ? (IN.P.NO: 174)
7.What is mesomeric effect ? (IN.P.NO: 168) ****
8. Chloroacetic acid is more acidic than acetic acid-explain .why ? (IN.P.NO: 167)
9.Explain homolytic and heterolytic cleavage with example . (IN.P.NO: 162) ****
10.Formic acid is stronger than acetic acid .why ? (IN.P.NO: 167)
11.What is inductive effect ? explain the influence of inductive effect on acidity of carboxylic acids. (IN.P.NO: 167) ****
12.The bond length between all the four carbon atoms is same in 1,3-butadiene. Explain with reason. (jun-2019) (IN.P.NO: 168)
13. write the electrophilic substitution reaction of benzene. (H-19) (IN.P.NO: 171)
14. Explain the substitution reaction and elimination reaction with example.(IN.P.NO: 171,173)
15. Explain heterolytic cleavage with example?. (IN.P.NO: 162)
16.Explain with example the positive mesomeric effect. (M-19) (IN.P.NO: 169)
17.Explain the acidic nature of phenol using ‘resonance’. (IN.P.NO: 169)
18.Write the order of relative stability of carbocation and carboanion.(IN.P.NO: 164)
19.Give the example of nucleophilic substitution reaction.(IN.P.NO : 171)