

ATOMIC STRUCTURE-II

1. What do you mean Dual nature of matter?
2. Distinguish between waves and particle (**June-2006**)
3. Give two experiments for verification of particle nature
4. Define –Orbital
5. State Heisenberg's uncertainty principle (**Dpt.Q, Mar-2006, Sep-2007, Mar-2007, Oct-2009, Mar-2011**)
6. He₂ molecule does not form why? (**Mar-2007, Oct-2008**)
7. Define-Bond order (**July-2007, Mar-2010**)
8. What is Hybridizations? (**Mar-2009**)
9. What is the significance of negative electronic energy? (**June-2008, June-2009, July-2010**)
10. What is the essential condition of effective hydrogen bonding? (**Oct-2006, June-2011**)
11. What is the significance of hydrogen bonding?

PERIODIC CLASSIFICATION-II

1. The value of Cl-Cl bond distance is 1.98Å⁰. what is the atomic radius of chlorine?
2. The experimental value of d(C-Cl) is 1.76Å⁰. what is the atomic radius of carbon? (**July-2007**)
3. Calculate the effective nuclear charge of K⁺ ion (**Sep-2007**)
4. State the Slater's rule
5. Why the ionization energy of Be is greater than Li? (**June-2006, June-2011**)
6. Why the ionization energy of Be is greater than B? (**Oct-2006, June-2008**)
7. Why the ionization energy of Fluorine is greater than Oxygen? (**Oct-2009**)
8. The electron affinity of Fluorine is less than that of Chlorine? (**Mar-2006, June-2009**)
9. What are the disadvantage of Pauling's scale and Milliken's scale? (**D.Q, Oct-2008**)
10. How do electro negativity values help to identify the nature of the bond?
11. How do electro negativity values to find the percentage ionic character in polar covalent bond?
12. Compare the ionization energy of nitrogen with Oxygen (**Mar-2007**)
13. Define electron affinity (**Mar-2007**)
14. Ionisation energy of Neon is greater than that Fluorine Give the reason (**Mar-2009, July-2010**)
15. The electron Affinities of beryllium and nitrogen are almost zero-why? (**Mar-2010**)

P-BLOCK ELEMENTS

1. What is inert pair effect? (**Mar-2009**)
2. What burnt alum?
3. What is plumbo solvency? (**D.Q, July-2006, Oct-2006, July-2007, June-2009, Mar-2009, June-2011**)

4. Write the reaction of Lead with conc HCl?
5. Explain the dehydrating property of P_2O_5 ?*(**Oct-2006, Mar-2007, Mar-2009**)
6. Explain the reducing property of H_3PO_3 ? (**July-2006**)
7. H_3PO_3 is diprotic-Explain?(**Mar-2006,Oct-2009**)
8. Explain the laboratory preparation of orthophosphoric acid?(**June-2008**)
9. H_3PO_4 is a tri basic acid-Explain
10. What happens when H_3PO_4 is heated? (**June-2009,Mar-2011**)
11. Write a note on etching on Glass (OR)
HF is not stored in glass bottle why? (**Mar-2007,Mar-2011**)
12. Give any three uses of Fluorine?
13. How will you prepare PH_3 in laboratory?
14. Explain the reducing property of PH_3 ?
15. Give the uses of Helium? (**Sep-2007**)
16. Give the uses of Neon (**D.Q, June-2008**)
17. Give the uses of Xenon?
18. Give the uses of Argon?
19. Give the uses of Krypton?
20. Give any three fluorides of Xenon?
21. Write note on Holmes signal?(**Sep-2007,Oct-2009,Mar-2009**)
22. Explain the oxidizing power of fluorine?(**July-2007**)
23. How is potash alum prepared?(**Mar-2008**)
24. Draw the electron dot formula for H_3PO_3 (**Mar-2008**)
25. What are inter halogen compounds? Give the preparation of any one (**Oct-2008**)
26. Draw the electron dot formula for i) H_3PO_3 and ii) PCl_5 (**Oct-2008,June-2011**)

D-BLOCK ELEMENTS

1. Why there is a slight variation in the atomic radii from Cr to Cu?
2. Why transition metal ions are colored? (**Oct-2009**)
3. Zn, Cd, Hg do not form colored ions?
4. Most of the transition metals and their compounds have catalytic activity why?
5. Why do d-block elements exhibit variable oxidation state?(**D.Q,Oct-2006,Mar-2007,July-2007,Mar-2009,Mar-2011**)
6. What are ferromagnetic substances? Give example
7. Why do d block elements form more complexes?(**D.Q,July-2006,Sep-2007,June2008,June-2009,Mar-2010,July-2010**)
8. Why do d-block elements form alloys?
9. What is the action of heat on copper sulphate? (**D.Q, Mar-2008**)
10. Explain the action of moist air on copper?

11. What is chrome plating (**Oct-2006, Mar-2008, Mar-2010**)
12. What is nichrome? Give its uses
13. What is philosopher's wool? How it is formed?
14. Explain the reaction of zinc with dilute acids?
15. What is spitting of silver? How it is prevented? (**Sep-2007, Oct-2008, July-2010, June-2011**)
16. What is aqua regia? Give the reaction of gold with aqua regia? (**Mar-2007, June-2011, Mar-2011**)
17. Write a note on fineness of gold
18. What is purple of cassius? How it is used?
19. What happens when $K_2Cr_2O_7$ is heated? Give the balanced equation
20. $K_2Cr_2O_7$ is powerful oxidizing agent explains. Give two examples (**July-2006**)
21. What is Blue vitriol? How it is prepared?
22. Explain the reaction of copper sulphate with ammonia?
23. What is Bordeaux mixture? Give its use
24. What is Lunar caustic? How it is prepared?
25. What is the action of heat on $AgNO_3$?
26. What is calamine? How it is prepared?
27. Write a note on chromyl chloride test (**Mar-2009**)
28. What is ammoniacal silver nitrate? How does it react with $HCOOH$?
29. Explain the action of heat with $ZnCO_3$?
30. What are uses of $ZnCO_3$?
31. Why Mn^{3+} is more stable than Mn^{2+} ? (**Mar-2006**)
- 32. All the reactions of copper sulphate**
33. A substance is found to have magnetic moment of 3.9 BM. How many unpaired electron does it contain? (**Mar-2006**)
34. Explain the electrolytic refining of copper? (**July-2007**)
35. What is the reaction of copper sulphate with KCN? (**July-2007**)
36. What is the reaction of Zinc on hot solution of NaOH? (**Oct-2008**)
37. Why do Zn^{2+} salts colorless while Ni^{2+} salts are colored? (**June-2009**)
38. What happens when KI solution is added to an aqueous solution of copper sulphate? (**Oct-2009**)

NUCLEAR CHEMISTRY

1. What is radioactivity?
2. Define Half life period
3. State radioactive disintegration theory
4. What is binding energy?
5. Give any three differences between nuclear reaction and chemical reaction (**Oct-2006**)

6. What is Q-value for a nuclear reaction? (**July-2006**)
7. What is spallation reaction?
8. What is nuclear fission reaction? Give example
9. What is nuclear fusion reaction? Give example
10. What is radio carbon dating?
11. Explain the principle behind in Hydrogen bomb? (**Mar-2006, Mar-2010**)
12. What are the significance of radio carbon dating? (**Mar-2011**)

ALL THE PROBLEMS IN NUCLEAR CHEMISTRY

SOLID STATE-II

1. What is unit cell?
2. What is Laue diffraction pattern?
3. State Bragg's Law? (**June-2011**)
4. Explain the four types of crystals?
5. What is point defect?
6. What is metal excess and metal deficiency defect?
7. What are super conductors? (**D.Q, Mar-2006, July-2006, Oct-2008, Jul-2009, Mar-2010**)
8. What is super conducting transition temperature? (**July-2007**)
9. Give the uses of super conductors? (**July-2010**)
10. How glasses are formed? (**Oct-2009**)
11. What is vitreous state? (**Oct-2006, Oct-2007**)
12. Calculate the number of CsCl unit in crystal (**Mar-2007**)
13. Write a note on molecular crystal (**Mar-2008, Mar-2011**)
14. Write a note on Frenkel defect (**June-2008**)
15. Sketch the following lattice a) simple centered cubic c) Body centered cubic (**March-2009**)

THERMODYNAMICS-II

1. State the Kelvin-Planck's statement of second law of thermodynamics? (**Mar-2007**)
2. What is Entropy? Give its units? (**Mar-2006**)
3. State Trouton's law (**June-2009**)
4. H_2 and He_2 do not obey Trouton's rule-why?
5. When does the entropy increases?
6. Define-Standard entropy
7. Define-Standard free energy
8. What is Gibb's free energy? (**July-2006**)

9. What types of liquids or substances deviate from Trouton's rule? **(Oct-2006, June-2011)**
10. State Clausius state of second law of thermodynamics **(July-2007)**
11. Mention the entropy state of second law of thermodynamics and mention the unit of entropy also. **(Oct-2008)**

PROBLEMS BASED ON TROUTON'S RULE

CHEMICAL EQUILIBRIUM-II

1. Why do chemical equilibrium is referred to as dynamic equilibrium?
2. State Law of mass action
3. Define-Equilibrium constant **(Oct-2009)**
4. State Lechatelier's principle **(D.Q, Mar-2007, and Mar-2010)**
5. Define-Degree of dissociation
6. Define reaction Quotient **(Sep-2007, June-2008, and July-2010, Mar-2011)**
7. Dissociation of PCl_5 decreases in the presence of increase in Cl_2 why? **(Mar-2009, June-2011)**
8. What happens when $\Delta n_g = 0, \Delta n_g = +ve, \Delta n_g = -ve$ in a gaseous reaction? **(July-2007)**
9. What is effect of change of pressure on equilibrium? Give example
10. What is effect of change of concentration on equilibrium? Give example
11. What is effect of change of temperature on equilibrium? Give example
12. What is the relationship between equilibrium constant and dissociations constant? Give one example **(Mar-2008)**

CHEMICAL KINETICS

1. Define order of a reaction **(July-2007, June-2008, and Mar-2009)**
2. What is first order reaction?
3. Give three characteristics of order of a reaction
4. Write the first order rate constant equation
5. Give three characteristics of first order reaction
6. Give three examples of first order reaction
7. What is half-life period? **(D.Q)**
8. Show that the half life period of first reaction is independent of initial concentrations of the reactant
9. What is Pseudo first order reaction? Give example **(June-2009, Oct-2009, June-2010, Mar-2011)**
10. What is zero order reaction? Give example
11. What is meant by threshold energy?
12. What is activation energy? **(Mar-2008, Oct-2008)**
13. Distinguish between simple and complex reaction **(D.Q)**
14. What is Consecutive reaction? Give example **(July-2006, Oct-2006)**
15. What is parallel reaction? Give example **(Mar-2007, June-2011)**
16. What is opposing reaction? Give example **(Mar-2006, July, June-2009, Mar-2010)**

17. Write the Arrhenius equation and explain the terms (**Mar-2007, Mar-2009, June-2011, Mar-2011**)
18. What are simple and complex reactions (**Sep-2007**)
19. What are complex reactions? Give example (**Oct-2008**)

PROBLEMS BASED ON HALF – LIFE PERIOD

SURFACE CHEMISTRY

1. What is adsorption?
2. What are adsorbent and adsorbate?
3. What are factors affecting adsorption?
4. What is catalysis? Give example
5. What are characteristics of catalyst?
6. Explain the following with examples
 - i) Positive catalysis
 - ii) negative catalysis
 - iii) Autocatalysis (**Oct-2006**)
 - iv) induced catalysis
7. What are promoters? Give example (**June-2008, Mar-2010, and June-2010**)
8. What is catalytic poison? Give example (**June-2007**)
9. What is active centre?
10. What are lyophilic colloids? Give example
11. What are lyophobic colloids? Give example
12. What is dialysis?
13. What is Brownian movement? Give reason (**June-2009**)
14. What is Tyndall's effect? (**June-2011**)
15. What is Hellhole's double layer?
16. What is electrophoresis? (**Mar-2006**)
17. What is electro osmosis (**Oct-2008**)
18. How is delta formed?
19. Give any four medicinal uses of colloids
20. What is emulsion? What are emulsifying agents? (**June-2006**)
21. Why does sky appear blue?
22. Gas in gas colloidal solution is not formed why? (**D.Q, Mar-2007**)
23. What is peptisation? Give an example (**Mar-2008**)
24. What is tanning? (**Sep-2007**)
25. What is heterogeneous catalysis? Give example (**Mar-2008**)
26. Give three differences between physical adsorption and chemical adsorption (**Oct-2009**)

ELECROCHEMISTRY-I

1. What are semiconductors? Give example
2. Define-Faraday
3. State Faraday's law of electrolysis (**D.Q, Mar-2006**)
4. Define-electro chemical equivalent (**June-2009**)
5. State Ostwald dilution law (**Mar-2009**)
6. What is common ion effect? Give example (**Oct-2006, July-2007, Oct-2007, and Mar-2008**)
7. What are buffer solutions? Give examples(**June-2010, June-2011**)
8. What is equivalent conductance? Give its unit (**June-2008**)
9. What is molar conductance? Give its unit
10. State Kohlraush's law (**Jun-2006, Oct-2008, and Oct-2009**)
11. What do mean ionic product of water?
12. What is cell constant? Give its unit (**Mar-2010**)
13. Phenolphthalein is not a suitable indicator for the titration of strong acid and weak base Why?
14. Methyl orange is not a suitable for the titration of strong base and weak acid why?

ISOMERISM IN ORGANIC CHEMISTRY

1. What is geometrical isomerism? Give example
2. Distinguish between enantiomers and diastereomers (**D.Q, June-2006**)
3. Distinguish between racemic mixture and meso structure (**Mar-2007**)
4. What is asymmetric carbon?
5. What is chirality?
6. What are the conditions for optical activity? (**Oct-2007**)
7. Give the structure of E-Z isomer of But-2-ene 1, 4 dioic acid
8. Meso tartaric acid is optically inactive-justify your answer (**Mar-2006, Oct-2006**)
9. What is racemic mixture? Give example (**Mar-2008**)
10. *Trans*-isomer is more stable than *cis*-isomer .Why?(**June-2011**)

HYROXYDERIVATIVE

1. The boiling point of alcohols is higher than corresponding hydrocarbons-reason out
2. Alcohols are soluble in water where as hydrocarbons are not-account for this
3. How can the consumption of alcohol by a person be detected? (**Mar-2006**)

4. What happens when alcohols heated to 410K in the presence of ConH_2SO_4 ?
5. Give the uses of methanol
6. Give the uses of ethanol
7. How will you prepare ethylene glycol from ethylene? **(Oct-2009)**
8. How is Dacron prepared? **(Mar-2009, June-2010)**
9. How will you convert ethylene glycol into ethylene?
10. What happens when ethylene glycol is heated to 773K?
11. Write the reaction of ethylene glycol with ZnCl_2 ?
12. Write the reaction of ethylene glycol with $\text{Con H}_3\text{PO}_4$
13. Write the reaction of ethylene glycol with $\text{Con H}_2\text{SO}_4$?
- (or) How ethylene glycol is converted into dioxan? **(Mar-2008, Oct-2008)**
14. How will you convert ethylene glycol into formic acid?
15. Give the oxidation reaction of ethylene glycol?
16. What is Soapification reaction?
17. Write the reaction of ethylene glycol with excess of HI?
18. What happens when glycerol react KHSO_4 ?* **(Mar-2007, Mar-2010, June-2011)**
19. Explain the reaction of glycerol with oxalic acid at 383K?
20. Explain the reaction of glycerol with oxalic acid at 533K? (Or)
- How alkyl alcohol is prepared from glycerol **(Sep-2007, June-2008)**
21. Give the oxidation of glycerol
22. Explain the synthesis of glycerol from propylene? (D.Q)
23. How will you convert benzyl alcohol into toluene?
24. Give the uses of benzyl alcohol **(Oct-2006)**
25. Explain the acidic nature of phenol
26. Give tests for phenol **(Sep-2007, Mar-2009)**
27. Explain Dow's process? **(July-2007, Mar-2010)**
28. How phenolphthalein is prepared? **(D.Q, Mar-2006, July-2006, June-2009)**
29. Why glycerol is more viscous than ethanol? **(July-2006)**
30. Phenol is insoluble in Na_2CO_3 but acetic acid is soluble-Give the reason **(Mar-2007)**
31. How will you convert ethyl alcohol into diethyl ether? **(July-2007)**
32. Alcohols cannot be used as a solvent for Grignard reagents. Why? **(Mar-2008)**
33. Give a chemical test to distinguish between ethanol and methanol **(Oct-2008)**
34. How will you convert 2-methyl 2-propanol into 2-methyl **(Oct-2008)**
35. Phenol is soluble in alcohol why? **(June-2010)**
36. How phenol is identified by dye test? Give equation **(June-2011)**

CARBONYL COMPOUNDS

1. Explain the isomerism in carbonyl compounds
2. What is Rosenmund's reduction? (**Sep-2007**)
3. What is Urotrophine? Give its use (**Oct-2006, Mar-2008, June-2009, Oct-2009, Mar-2010, June-2011**)

(OR)

How does formaldehyde react with ammonia? (**July-2006**)

4. Explain the reaction of ammonia with benzaldehyde
5. How will you convert acetone into propane?
6. Give the tests for aldehydes (**June-2008**)
7. Give the polymerization reactions of formaldehyde and acetaldehyde
8. Give the uses of acetaldehyde
9. Give the uses of formaldehyde
10. What is Formalin? Give its use (**July-2007**)
11. Give the reaction of benzaldehyde with Chlorine in the absence of catalyst
12. Give the reaction of benzaldehyde with Chlorine in the presence of catalyst
13. Give the uses of benzaldehyde
14. Explain the haloform reaction? (**Oct-2008**)
15. Explain the reaction of two molecules of acetone with dry HCl
16. Explain the reaction of three molecules of acetone with dry HCl?
17. Explain the reaction of acetone with $\text{Con.H}_2\text{SO}_4$?
18. How is acetophenone prepared by Friedel-Craft's reaction? (**Mar-2011**)