KIDS CLUB MATRIC. HR. SEC. SCHOOL

I . METALLURGY

1. Explain the Mond process of refining Nickel.
2. Explain zone refining process with example,
3. What is the difference between minerals and ores,
4. Explain the principle of electrolytic refining with an example,
5. Give the limitations of Ellingham diagram,
6. What is Gravity separation or Hydraulic wash?
7. What is acid Leaching give examples,
8. What is the role of quicklime in the extraction of iron from its oxide Fe2O3,
9. Short notes on electrochemical principle of metallurgy
10. Explain the terms i) Gangue. Ii) Slag
11. Write a note on Froth flotation process
12. What is blistered copper?
13. What is distillation?
14. What is liquation?
15. Write the applications of zinc
16. Explain refining of titanium
17. Explain extraction of Aluminium Hall-Heroult process

2. P-Block elements - I

1.What is catenation? write the conditions for Catenation,
2.Write a note on Fisher Tropsch synthesis
3. Explain the structure of Diborane
4.How will you identify borate radical?
5. Write a note on zeolite,
6.CO is a reducing agent prove it,
7.Write the uses of boric acid
8.What is inorganic benzene (borosol)How is it prepared?
9.How Potash Alam is prepared ?write its uses
10.What is Burnt Alam?
11.There is only a marginal difference in decrease in ionization enthalpy from aluminium to Thallium, why?
12.What are the different type of silicons?
13. Write the difference between Graphite and Diamond,

14. What is the action of heat on boric acid?
15. How will you convert boric acid to boron nitride?
16.What is hydroboration?
17.Give one example for each of the following (i) icosagens (ii) tetragens. (iii) pnictogens. (iv) chalcogens
18.Compare the structure of CO and CO_2
19. What is amphiboles? give example

3. P -block elements - II

1. What is inert pair effect?
2. What are interhalogen compounds? Give examples, write its properties,
3. Give the uses of helium
4. Write the uses of Helium, Neon Argan Krypton, xenon and Radon
5. What is the action of chlorine with cold NaOH and hot NaOH?
6. Write the uses of oxygen
7. How bleaching powder is prepared?
8. Why HF cannot be stored in glass bottles?
9. Sulfuric acid is a dibasic acid prove it
10 . Explain bleaching action of Sulphur dioxide,
11 . What is the action of heat on Phosphorus acid?
12 . What is Aqua regia ?write the action of Aquar regia on gold,
13 . Explain oxidizing property and reducing property of Sulphur dioxide,
14 . How chlorine is prepared in the laboratory?
15 . Why HF is a week acid other haloacids are strong?
16 . Write a note on Holmes signal

4 . Transaction And Inner Transition Elements

1. d- block elements form complexes easily why?
2. Justify the position of lanthanoids and actinoids in the periodic table,
3. Describe the preparation of potassium oo ofdichromate.
4. What is lanthanoid contraction and what are the effects of lanthanoid contraction?
5. What are interstitial compounds? Give example
6. Calculate the number of unpaired electrons in Ti^{3+} , Mn^{2+} and calculate the spin only magnetic moment.
7. Which is more stable? Fe^{3+} or Fe^{2+} - explain.
8. Compare lanthanoids and actinoids

9. Explain why Cr^{2+} is strongly reducing while Mn^{3+} is strongly oxidizing.
10. Compare the ionization enthalpies of first series of the transition elements.
11. Actinoid contraction is greater from element to element than the lanthanoid contraction, why?
12. Out of $Lu(OH)_3$ and $La(OH)_3$which is more basic and why?
13. Why Europium (II) is more stable than Cerium (II)?
14. Why do Zirconium and Hafnium exhibit similar properties?
15. Which is stronger reducing agent Cr^{2+} or Fe^{2+}?
16. The E^0 M^{2+} M/value for copper is positive. Suggest a possible reason for this.
17. Why first ionization enthalpy of chromium is lower than that of zinc?
18. Transition metals show high melting points. Why?
19. Why Gd^{3+} is colourless?
20. Why compounds of Cu^{2+} are coloured but Zn^{2+} colourless?
21. What is Chromyl chloride test?
22. How potassium dichromate is useful to us?

5.Coordination chemistry

1.Based on VB theory explain why $[Cr(NH_3)_6]^{3+}$ is paramagnetic, while $[Ni(CN)_4]^{2-}$is diamagnetic.?
2. $[Ti(H_2O)_6]^{3+}$ is coloured, while $[Sc(H_2O)_6]^{3+}$ is colourless- explain
3. In an octahedral crystal field, draw the figure to show splitting of d orbitals.
4. What is linkage isomerism? Explain with an example,
5. Classify the following ligands based on the number of donor atoms.
a) NH_3 b) en c) ox^{2-} d) pyridine
6.Give the difference between double salts and coordination compounds.
7.Write the postulates of Werner's theory, and write its limitations,
8.Why tetrahedral complexes do not exhibit geometrical isomerism.
9.Explain optical isomerism in coordination compounds with an example.
10.What are hydrate isomers? Explain with an example.
11.What is crystal field splitting energy?
12.What is crystal field stabilization energy (CFSE) ?
13.A solution of$[Ni(H_2O)_6]^{2+}$is green, whereas a solution of $[Ni(CN)_4]^{2-}$is colourless, why?
14. Discuss briefly the nature of bonding in metal carbonyls.
15. On the basis of VB theory explain the nature of bonding in$[Co(C_2O_4)_3]^{3-}$

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16.What are the limitations of VB theory?
17.Write the oxidation state, coordination number , nature of ligand, magnetic property and electronic configuration in octahedral crystal field for the complex $K_4[Mn(CN)_6]$
18. What is inert and labile complexes?
19. Write the Postulates of valence bond theory
20. Write a note on i)coordination isomers ii)ionization isomers iii) Solvate isomers
21. What is stability constant?

6.Solid state

1. Define unit cell.
2. Give any three characteristics of ionic crystals.
3. Differentiate crystalline solids from amorphous solids.
4. Explain briefly seven types of unit cell.
5. Distinguish between hexagonal close packing and cubic close packing.
6.Distinguish tetrahedral from octahedral voids.
7. What are point defects?
8. Explain Schottky defect.
9.Write short note on metal excess and metal deficiency defect with an example.
10.Calculate the number of atoms in a SC,BCC,FCC
11. Why ionic crystals are hard and brittle?
12.What is packing efficiency ? Calculate percentage of packing efficiency of BCC crystal,
13. What is meant by the term “coordination number”? What is the coordination number of atoms in a bcc structure?
14. Write a note on Frenkel defect.
15.Write Bragg equation and explain the terms,
16. Define isotropy and anisotropy in solids
17. What is primitive and non primitive unit cell?
18. What is crystal lattice?
19. Write some general characteristics of solid,
20. Write the classification of solids
21. Write a note oni) covalent solid ii)molecular solid iii) metallic solid
22. Derive packing efficiency of simple cube,

23. Derive packing efficiency of FCC.
24. Write a note on impurity defect.

7 . Chemical kinetics

1. Define average rate and instantaneous rate,
2. Define rate law and rate constant.
3. Derive integrated rate law for a zero order reaction A → Product
4. Define half life period of a reaction. Show that for a first order reaction half life is independent of initial concentration.
5. What is an elementary reaction? Give the differences between order and molecularity of a reaction.
6. Explain the rate determining step with an example.
7. Derive integrated rate law for a first order reaction,
8. Explain the effect of catalyst on reaction rate with an example.
9. Explain briefly the collision theory of bimolecular reactions.
10. Write Arrhenius equation and explains the terms involved.
11. Give two exapmles for zero order reaction
12. Explain pseudo first order reaction with an example
13.How do concentrations of the reactant influence the rate of reaction?
14. How do nature of the reactant influence rate of reaction?
15.The rate constant for a first order reaction is 1.54×10^{-3} s^{-1}. Calculate its half life time.
16. Give some example for first order reaction,
17. Differentiate rate from rate constant of a reaction.
18. Define activation energy,
19. Write the difference between order and molecularity,

8.Ionic Equilibrium

1. What are Lewis acids and bases? Give two example for each.
2. Discuss the Lowry – Bronsted concept (Proton theory)of acids and bases.Write its limitations
3. The concentration of hydroxide ion in a water sample is found to be $2.5X10^{-6}$ M Identify the nature of the solution.
4. Calculate the pH of 0.04 M HNO_3 Solution.
5. Define solubility product
6. what is Buffer solution? write the buffer action .
7.Explain common ion effect with an example
8.Derive an expression for Ostwald's dilution law

9.Define pH
10.Calculate the pH of 1.5×10^{-3} M solution of $Ba(OH)_2$
11. Derive an expression for the hydrolysis constant and degree of hydrolysis of salt of strong acid and weak base,
12. Write the expression for the solubility product of $Ca_3(PO_4)_2$,
13. Write the expression for the solubility product of Hg_2Cl_2.
14. Define ionic product of water give its value at room temperature,
15. What is Arrhenius concept of acids and bases? write its limitations,
16. Write the relation between solubility product and ionic product
17. Derive relation between p^H and p^{OH},
18. Derive Henderson equation (or)Derive an equation to find p^H of a buffer solution,
19. Distinguish Lewis acid from Lewis base,
20. Define buffer capacity and buffer index

9. Electrochemistry

1. Define anode and cathode
2. Why does conductivity of a solution decrease on dilution of the solution ?
3. State Kohlrausch Law. How is it useful to determine the molar conductivity of weak electrolyte at infinite dilution?
4. Describe the electrolysis of molten NaCl using inert electrodes
5. State Faraday's Laws of electrolysis
6. Describe the construction of Daniel cell. Write the cell reaction.
7. Define i) Molar conductivity ii) equivalent conductance
8. Which of 0.1M HCl and 0.1 M KCl do you expect to have greater Λ^0m and why?
9.Arrange the following solutions in the decreasing order of specific conductance.
i) 0.01M KCl ii) 0.005M KCl
iii) 0.1M KCl iv) 0.25 M KCl v) 0.5 M KCl
10. Why is AC current used instead of DC in measuring the electrolytic conductance?
11. Derive an expression for Nernst equation
12.Write a note on sacrificial protection.
13.Explain the function of H_2 - O_2 fuel cell.
14.Ionic conductance at infinite dilution of Al^{3+} and SO_4^{2-} are 189 and 160 mho cm^2 $equiv^{-1}$. L Calculate the equivalent and molar conductance of the

electrolyte $Al_2(SO_4)_3$at infinite dilution
14. What are the factors affecting electrolytic conductance?
15. Write a note on lithium-ion battery,
16. What is corrosion? What are the methods employed in prevention of corrosion?

10. Surface Chemistry

1. Differentiate physisorption and chemisorption
2. Write a note on i) Promoters ii)Catalytic poisons iii)Autocatalyst IV) Negative catalyst v) Active centre
3. What is Phase transfer catalysis?
4. What is peptization?
5. What is Tyndall effect?
6.What is Brownian moments?
7. What is Helmholtz double layer theory?
8.What are the factors which influence the adsorption of a gas on a solid?
9.What are enzymes? Write a brief note on the mechanism of enzyme catalysis.
10. Differentiate adsorption from absorption
11. Explain electro osmosis technique,
12.Give three uses of emulsions.
13. what are emulsions write the types of emulsion.
14.Give some Demulsification techniques
15. Define gold number
16.Explain any one method for coagulation
17.Write a note on electro osmosis
18..Write a note on catalytic poison
19.Explain intermediate compound formation theory of catalysis with an example
20.What is the difference between homogenous and heterogeneous catalysis?
21.Describe adsorption theory of catalysis.
22.Write various methods of purification of colloids,
23. Explain electrophoresis or cataphoresis?
24.Write various methods of preparation of colloids
25. Explain the preparation of Colloids by condensation method,

11. Hydroxy compounds and Ethers

1. How is phenol prepared from
i) chloro benzene ii) isopropyl benzene
2.Explain Kolbe's reaction
3. How will you convert acetylene into n-butyl alcohol.
4. What is metamerism?
5.Write the preparation of glycol from ethylene.
6. what is swern oxidation reaction?
7. How Dioxane is prepared?
8. Write the conversion of glycerol to acrolein?
9. Write the uses of methanol, ethanol, ethylene glycol, glycerol.
10. What is Schotten Baumann reaction?
11. What is Reimer Tieman reaction?
12. How phenolphthalein is prepared?
13. What is Williamson ether synthesis?
14. What is coupling reaction?
15. What is Saytzef's rule?
16. Write the uses of Diethyl ether .
17. How will you differentiate alcohol from phenol?
18.Explain the distinguish of alcohol by victormeyer method.
19.What is Lucas test?

12. Carbonyl compounds and carboxylic acids.

1. Write the uses of formic acid.
2. What is Urotropine ? How is it prepare? write the structure and uses.
3. what is popoff's rule give examples?
4. What is Clemmensen reduction?
5. Write wolf kishner reduction?
6. What is cannizaro reaction? Write its mechanism.
7. What is benzoin condensation?
8. What is Knoevenagal reaction?
9. Explain reducing properties of formic acid?
10. Give some test for carboxylic acid
11. What is transterfication reaction?
12. What is Claisen condensation reaction?
13. What is Rosenmund reduction?
14. What is Hoffmen's degradation reaction?
15. What is Haloform reaction?
16. Write the mechanism of Aldol condensation reaction,

17. What is esterification reaction? write its mechanism
18. What is crossed Aldol condensation?
19. What is Gattermann koch reaction?
20.Write Friedel-craft alkylation and acylation,
21. What is HVZ reaction?

13. Organic nitrogen compounds

1. Write short notes on the following
   i.Hofmann's bromide reaction
   ii.Gabriel phthalimide synthesis
   iii.Schotten – Baumann reaction
   iv.Carbylamine reaction
   v.Mustard oil reaction
   vi.Coupling reaction
   vii. Diazotisation
   Viii.Gomberg reaction
2. Differentiate nitro form from aciform?
3. What is nef carbonyl synthesis?
4. What is Libermann's nitro test?
5. What is sandmeyer reactions?
6. What is Gattermann reaction?
7. What is Baltz-schiemann reaction?
8. Why Aniline does not undergo Friedel craft reaction?
9. What is chloropicrin? How is it prepared? Write its uses,
10. Alkylamine is water soluble where as Aniline does not ,why?
11.pKb of Aniline is more than that of methyl Amine,why?
12.What is Levine and Hauser acetylation?
13.What is Thorpe nitrile condensation?

14. Biomolecules

1. Give any three difference between DNA and RNA
2. What is peptide bond? How is it formed?
3.Give two difference between Hormones and vitamins
4.Write a note on denaturation of proteins
5.What are reducing and non – reducing sugars?
6..Why carbohydrates are generally optically active.
7.Classify the following into monosaccharides, oligosaccharides and

polysaccharides.
i) Starch. ii) fructose iii) sucrose iv) lactose iv) maltose
8.What are vitamins ? How they are classified ?
9.What are harmones? Give examples
10.Write the importance of carbohydrates
11.What is enzymes ? Give examples,
12.Write the structure of α-D (+) glucophyranose
13.What are different types of RNA which are found in cell
14.What are the functions of lipids in living organism.
15. What is a epimer and epimerization?
16. What is glycosidic linkage?
17. What is mutarotation?
18. What is anomers? give example
19. What is Zwitter ion?give example
20. Write the structure elucidation of glucose,
21. Write the structure elucidation of fructose,
22. What is isoelectric point?
23. Write the importance of proteins.

15.Chemistry in everyday life

1.What are antibiotics?
2. Name one substance which can act as both analgesic and antipyretic
3. Write a note on synthetic detergents
4. How do antiseptics differ from disinfectants?
5. What are food preservatives?
6. What are drugs? How are they classified ?
7. How the tranquilizers work in body. ?
8. Write the structural formula of aspirin.
9. Explain the mechanism of cleansing action of soaps and detergents
10. Which sweetening agent are used to prepare sweets for a diabetic patients
11. What are narcotic and non – narcotic drugs. Give examples
12. What are anti fertility drugs? Give examples.
13. Write a note on co –polymer,
14. What are bio degradable polymers? Give examples.
15. How is terylene prepared?
16. Write a note on vulcanization of rubber
17. Classify the following as linear, branched or cross linked polymers

a) Bakelite b) Nylon-6,6 c) LDPE d) HDPE
18. Write the advantages of food additives
19. Define TFM
20. How Teflon is prepared? give its uses
21. What is PAN(Orlon)? How is it prepared?write its uses
22. Write a note on Nylon 6,6
23. How melamine formaldehyde is prepared? Give its uses.
24. How nylon-6 is prepared ?Give its uses