SET A

B.Sc. CHEMISTRY
THIRD SEMESTER
INORGANIC CHEMISTRY II
BSC – 301 [SPECIAL REPEAT]

[USE OMR FOR OBJECTIVE PART]

Duration: 3 hrs. **Full Marks: 70**

Objective

Time: 30 min. **Marks: 20**

Choose the correct answer from the following: ***1X20=20***

1. In a reaction between H_3O^+ and NO_2^-, the conjugate base of the acid H_3O^+ is
   a. H_2O b. OH^-
   c. H^+ d. OH^+

2. In the reaction $F^- + BrF_3 \rightarrow BrF_4^-$, the KF is considered as -
   a. Acid b. Base
   c. Amphoteric d. Solvent

3. Cu^{2+} ion is
   a. Hard acid b. Borderline acid
   c. Soft acid d. Soft base

4. The inorganic polymer used for manufacture of soft contact lenses is
   a. Nylon b. Polyphosphazenes
   c. Polysiloxanes d. Glasses

5. The Silicates used for water softening is -
   a. Sheet silicate Mica b. Framework silicate Ultramarine
   c. Framework silicate Feldspar d. Framework silicate Zeolite

6. The active metals are
   a. Reluctant to get oxidized b. Reluctant to get reduced
   c. Eager to get reduced. d. None of the above

7. Smelting is
   a. Oxidation b. Reduction.
   c. Thermit process d. None of the above.

8. The process in which a metal is obtained by simply heating the sulphide ore is called
   a. Smelting b. roasting
   c. Pyrometallurgical process. d. None of the above.

9. Pyro metallurgical process refers to
   a. Hydrolysis of a metal ore. b. Heating of oxide with coke.
   c. Ionization in water d. None of the above.

10. In Goldschmidt thermit Process, the metal used for reducing the oxide of another metal is
    a. Gold
    b. Manganese
    c. Aluminium
    d. None of the above.

11. The hybridization of XeF_6 molecule is
    a. Sp^3d^3
    b. Sp^3d^2
    c. Sp^3
    d. Sp^2

12. Which of the following statements is **incorrect** about noble gases?
    a. They are monoatomic
    b. They are colourless
    c. They are odourless
    d. They all have an outer electronic configuration of ns^2np^6

13. Which among the following noble gases does not form clathrates?
    a. Argon
    b. Xenon
    c. Krypton
    d. Helium

14. Partial hydrolysis of XeF_6 gives
    a. $XeOF_4$ and XeO_2F_2
    b. XeO_3 and XeO_2F_2
    c. $XeOF_4$ and $XeOF_2$
    d. XeO_3 and $XeOF_4$

15. When Xenon reacts with fluorine in a ratio of 1:5 at a temperature of 873 K it forms
    a. XeF_4
    b. XeF_6
    c. $XeOF_4$
    d. XeF_2

16. Anomalous behaviour of first member of each group of the periodic table is due to
    a. Small size
    b. High electronegativity
    c. Unavailability of d orbital
    d. All of the above

17. Inert pair effect is due to
    a. Poor shielding of d and f orbitals
    b. Reluctance of ns^2 electrons to take part in bonding
    c. Both of the above
    d. None of the above

18. Polymeric Boron nitride has similar structure with
    a. Diamond
    b. Graphite
    c. Diborane
    d. None of the above

19. Mixing diborane and ammonia in 1:2 ratio respectively at 300° C produces
    a. $(BN)_x$
    b. $B_3N_3H_6$
    c. $BH_3.NH_3$
    d. None of the above

20. Chemically borax is
    a. Sodium metaborate
    b. Sodium orthoborate
    c. Sodium hexaborate
    d. Sodium tetraborate decahydrate

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Descriptive

Time : 2 hrs. 30 min. **Marks : 50**

[Answer question no.1 & any four (4) from the rest]

1. a. Write the structure of Cyclic-polysiloxane. What are the applications of polysiloxanes? **3+2+2+3 =10**

   b. What is zone refining? How is impure metal purified by this process?

   c. Write the preparation of XeF_2.

   d. What is inorganic benzene and why it is called so.

2. a. What are the factors that determine the Lewis Acidity? **3+2+5 =10**

   b. Explain why aqueous solution of Na_2CO_3 is alkaline?

   c. What are the structures of different types of silicates?

3. a. What are the applications of HSAB principles in the interpretation of the properties of compounds? **5+5=10**

   b. Discuss the preparation, structure and applications of polyphosphazenes.

4. a. What is meant by Parting process? How is it carried out with sulphuric acid? **1+4=5**

   b. How is nickel extracted by Mond's process? **5**

5. a. How is zirconium ultra purified by von Arkel-de-Boer process? **5**

   b. Write the preparation and chemical properties of XeF_4. **5**

6. a. Explain the chemical properties and structure of XeF_6 **5+5=10**

   b. Explain the clathrates of noble gases and mention its uses.

7. **a.** Why it is difficult to titrate boric acid against NaOH and how to overcome the difficulty? Write the structure of all the oxides of nitrogen. **3+2=5**

b. Write preparations and structures of three oxides of phosphorus. Show two reactions where phosphorus acid acts as strong reducing agent **3+2= 5**

8. **a.** Why nitrogen forms N_2 and but phosphorus forms P_4 at room temperature? Why $BiCl_5$ is highly unstable. **2.5+2.5 =5**

b. Write differences between allotropy and catenation with examples. Explain diagonal relationship with examples. **2.5+2.5 =5**

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