15P111 Name……

Reg. No. ……

FIRST SEMESTER M.Sc. DEGREE EXTERNAL EXAMINATION, FEBRUARY 2016

(2015 Admission)

CC15P CHI C02 – Elementary Inorganic Chemistry

(Chemistry)

Time: 3 Hours **Maximum weightage: 36**

SECTION - A

(Answer **all** questions. Each question carries 1 weightage)

1. Arrange the following isoelectronic species in the increasing order of radius?
   Mg^{2+}, N^{3-}, O^{2-}, F^{-}
2. Which will have higher boiling point PH_3 or NH_3? Substantiate your answer.
3. What happens when Hg_2Cl_2 is added to liquid ammonia?
4. How supper acids are prepared? Mention their uses.
5. Applying Wade's rule, classify the following species as closo / nido / arachino structures.
   a) B_4H_{10} b) $C_2B_{10}H_{12}$ c) B_5H_9 d) $C_2B_3H_5$
6. What is inorganic benzene? Compare its structure with that of benzene.
7. What is zeolite? What are the ultramarines?
8. Give two examples for isopoly anions of vanadium.
9. Account for the abrupt changes taking place in Ellingham diagrams.
10. How silicides are prepared? Mention their uses.
11. Differentiate photonuclear reactions from thermonuclear reactions?
12. Give three examples for uranyl compounds. Also give one example each for compounds of uranium with +3, +4, and +5 oxidation states.

(12 X 1 = 12 weightage)

SECTION - B

(Answer **any 8** questions. Each question carries weightage of 2)

13. Arrange the following compounds in the increasing order of basicity both in gas phase and solution phase. Substantiate your answer.
    NH_3, CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$

14. Explain the bent rule of hybridization
15. Explain HSAB concept of acids and bases.
16. Explain Vander Waals forces.
17. What are carboranes? How are the boranes and carboranes classified?
18. The Styx numbers of B_3H_8 are 2013. Explain this statement and give its structure.
19. How silicones are prepared? What are the reasons for their thermal stability and chemical inertness?
20. What are carbides? Give any two examples and their uses.
21. Explain the Bethe's notation of nuclear process with proper examples.
22. What are Latimer diagram? Explain how Latimer diagram is converted into reduction half cell reaction in acid solution.
23. What are super heavy elements? Give two examples? Give the method of production of any two super heavy elements.
24. What is dosimetry? Explain radiation hazards.

(8 X 2 = 16 weightage)

SECTION - C

(Answer **any 2** questions. Each question carries a weightage of 4)

25. Give an account of the synthesis, structure, bonding, and uses of phosphorus – nitrogen and sulphur-nitrogen compounds.
26. Compare and explain the tendencies of lanthanides and actinides to form complexes. Also compare the magnetic and spectral properties of 4f and 5f elements.
27. What are silicates? Draw the structures of 5 different types of silicates. Also give examples for each type of silicate giving their formula?
28. Give auto-ionisation equation for liquid HF. Explain its non-aqueous behavior giving suitable reactions with BF_3, AsF_5 and $KMnO_4$. In liquid HF both BrF_3 , IF_5 are bases while AlF_3 is an acid. Explain.

(2 X 4 = 8 weightage)

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