

D 13267

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Name.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2016

(CUCSS)

Chemistry

CH 1C 02—ELEMENTARY INORGANIC CHEMISTRY

(2015 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A

Answer all questions.

Each question carries 1 weightage.

1. Draw the Lewis structures for (i) O_2 ; (ii) $CaCl_2$.
2. Give *two* examples of compounds that deviate from Octet rule.
3. Classify the following as Lewis acid or Lewis base giving reasons :
(i) BF_3 . (ii) NH_3 .
4. What is meant by levelling effect ? Give an example.
5. Classify the following compounds according to Wade's rule :
(i) BaH_{14}^- . (ii) $C_2B_{10}H_{12}$.
6. $LiOH$ decomposes on red heat, while $NaOH$ is stable. Give reason.
7. Predict the anions in the following silicates and draw their structures :
(i) Phenacite. (ii) Thortveitite.
8. Identify the general class of following silicate minerals :
(i) Feldspar. (ii) Benitoite.
9. When do the oxidation state other than + 3 occur in lanthanides.
10. Give the electronic configurations of Gd^{+3} and Ce^{+3} .
11. What is the nuclide A formed in the reaction of $^{24}Mg(a, n)A$?
12. The species ^{15}O and ^{14}C emits a positron and a beta particle respectively. What are the resulting species formed ?

(12 x 1 = 12 weightage)

Turn over

Part B

Answer any eight questions.

Each question carries 2 weightage.

13. Apply VSEPR theory to predict the structure of :
- (i) XeF_4 ; (ii) SF_6 ; (iii) COCl_2 .
14. List the consequences of hydrogen bonding.
15. With equations and words, explain what happens :
- (a) When metallic potassium is dissolved in NH_3 to form a dilute solution.
- (b) When more potassium is added to form concentrated solution.
- (c) When (a) is treated with Fe_2O_3 .
- (d) How can (c) be considered as a levelling reaction.
16. Complete and balance the following equations and identifying the acids and bases :
- (i) $\text{SO}_3 + \text{K}_2\text{O} \longrightarrow$
- (ii) $\text{MgO} + \text{Al}_2\text{O}_3 \longrightarrow$
17. With equations, show the following reaction :
- (i) Pyrolysis of B_3H_8^- ion.
- (ii) Me_2S reacted with $\text{B}_{10}\text{H}_{10}$.
- (iii) BH_4^- and B_2H_6 reacted in situ.
18. Derive **styx** code for B_5H_{11} and draw its structure.
19. How are α , β - P_4S_4 synthesised. Draw their structures ?
20. Give the synthesis of S_4N_4 and describe its structure and bonding.
21. Sketch and discuss Effingham diagram and its utility.
22. Give an account on the **hetero** poly acids formed by Molybdenum and describe its structure.
23. Write note on : (i) GM counters ; (ii) radiation dosimetry.
24. Outline the importance of neutron activation analysis.

(8 x 2 = 16 weightage)

Part C

Answer any **two** questions.

Each question carries **4 weightage**.

25. Discuss the Bent rule and the energies involved in hybridisation.
26. Detail the systematics of Lewis acid – Lewis base interactions in terms of **Drago**–Wayland equation.
27. Draw the structure of **diborane** and explain the bonding involved with suitable experimental evidences.
28. Discuss the structure and bonding in **phosphazene** by Craig and Paddock.

(2 x 4 = 8 weightage)