M 8719

II Semester B.Sc. Degree (CCSS-Supple./Improv.) Examination, May 2015

(2013 and Earlier Admn.)

Core Course in Chemistry

2B03CHE : THEORETICAL AND INORGANIC CHEMISTRY

Time : 3 Hours

Max. Weightage : 25

SECTION – A

(Answer **all** questions. **Each** bunch of **four** questions carries a weightage of **1**)
(Choose the correct answer).

1. i) Certain metals such as potassium emit electrons when irradiated with visible light. This phenomenon is called.
   - a) Photoelectric effect
   - b) Zeeman effect
   - c) Radioactivity
   - d) Fluorescence

   ii) Paschen series is obtained when the electron jumps from higher level to _____ level.
   - a) 1
   - b) 2
   - c) 3
   - d) 4

   iii) The acceptable wave functions are known as
   - a) Eigen functions
   - b) Eigen values
   - c) Orbit
   - d) Matter waves

   iv) According to Bohr theory, the radius of first orbit is 0.0529 nm. Radius of second orbit will be
   - a) 0.1058 nm
   - b) 0.2116 nm
   - c) 0.1587 nm
   - d) 0.4716 nm

2. i) Number of nodal planes in 2p orbital is
   - a) 0
   - b) 1
   - c) 2
   - d) 3

   ii) The effective nuclear charge felt by 1s electron of helium atom is
   - a) 2
   - b) 1.70
   - c) 1.40
   - d) 2.30

   iii) Maximum number of orbitals possible in a sub shell having '1' value = 4 is
   - a) 9
   - b) 5
   - c) 18
   - d) 8

   iv) In an ionic solid, radius of anion is twice that of cation. Possible coordination number is
   - a) 3
   - b) 4
   - c) 6
   - d) 8

P.T.O.

3. i) In which of the following molecules, the central atom undergoes sp^3d^2 hybridization ?

   a) NH_3 b) H_2O c) SF_6 d) BeF_2

  ii) The London dispersive forces is directly proportional to

   a) $1/r^6$ b) $1/r^5$ c) $1/r^4$ d) $1/r^2$

  iii) Which of the following molecules has zero dipole moment ?

   a) H_2O b) SO_2 c) CO_2 d) NH_3

  iv) The half life period of a radioactive substance is 10 h. Its average life period is

   a) 10 h   b) 0.1 h   c) 14.4 h   d) 0.144 h

4. i) Absorption of 100 ergs per gram of a radioactive substance is known as

   a) 1 rad   b) 1 gray   c) 1 curie   d) 1 roentgen

  ii) KNH_2 is _____ in liquid ammonia medium.

   a) Acidic   b) Basic   c) Neutral   d) Amphoteric

  iii) In liquid ammonia, reaction between KNH_2 and _____ is an example for neutralization reaction.

   a) NH_4Cl b) KCl c) HCl d) BF_3

  iv) Geiger Nuttal rule gives a relation between decay constant(λ) and _____

   a) Number of α particles   b) Range of α particles

   c) Number of β particles   d) Range of β particles

(Weightage 4×1=4)

SECTION – B

(Answer **any 5** questions. **Each** carries a weightage of **1.**)

5. What are matter waves ?

6. State Heisenberg uncertainty principle.

7. NH_3 has higher boiling point than PH_3. Why ?

8. What is lattice energy ?

9. What is meant by magic number ?

10. How many α and β particles will be emitted when $_{92}U^{238}$ changes to $_{82}Pb^{206}$?

11. What happens when alkali metals dissolve in liquid ammonia ?

12. What is meant by leveling effect ?

(Weightage 5×1=5)

SECTION – C

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

13. Discuss briefly the four quantum numbers.

14. Explain Fajan's rule.

15. Explain the geometry of ClF_3 molecule.

16. Calculate the mass defect and energy released in the formation of argon atom ($_{18}Ar^{40}$). Actual isotopic mass of $_{18}Ar^{40}$ = 39.962384 amu. (mass of hydrogen atom = 1.007825 amu and mass of neutron = 1.008665 amu)

17. Explain the precipitation reaction in liquid ammonia.

18. Write a short note on the classification of solvents.

(Weightage 4×2=8)

SECTION – D

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

19. Draw the molecular level diagram of O_2 and NO molecules. Calculate the bond order and comment on their magnetic properties.

20. What is radioactivity ? Derive an expression for the disintegration constant and half life period of a radioactive substance.

21. Write a short note on the important chemical reactions in liquid SO_2 and liquid HF medium.

(Weightage 2×4=8)

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