P. P. SAVANI UNIVERSITY

FifthSemester of B.Sc. Examination

December-2021

SSCH3010–Inorganic Chemistry -VI

07.12.2021, Tuesday **Time: 09:00 a.m. to 11:30 a.m. Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a Which of the following are behaves as base in liquid ammonia?

- **A** Amides
- **B** Imides
- **C** Nitrides
- **D** All

1.1b Reaction of AgCl and KNO_3 gives

- **A** No reaction
- **B** $AgNO_3$
- **C** KCl
- **D** Both KCl and $AgNO_3$

1.1c HF is an example of _____ solvent.

- **A** Protic
- **B** Aprotic
- **C** Both
- **D** None

1.1d Which of the following molecules contains a C_3 axis and a σ_v plane

- **A** $NiCl_4$
- **B** CH_4
- **C** NH_3
- **D** None

1.1e Which of the following is the amphoteric solvent?

- **A** Water
- **B** Methanol
- **C** Ethanol
- **D** All

1.1f Which of the following molecules contains a $\sigma_h$plane?

- **A** H_2O
- **B** $[PtCl_4]^{2-}$
- **C** Both
- **D** None

1.1g _____symmetry elements present in C_6H_6molecule

A D_6h
B D_3h
C C_2V
D None

1.1h BF_3 possess _____ point group.

A D_{4d}
B C_{2v}
C C_{3v}
D D_3h

1.1i The plane which is parallel to theaxis called _____.

A Vertical plane of symmetry
B Horizontal plane of symmetry
C Dihedral plane of symmetry
D Molecular plane of symmetry

1.1j To get the identical structure in BF_3how many symmetry operations is required?

A C_2
B C_3
C C_4
D None

1.2 **Answer the Following: (MCQ/Short Question/Fill in the Blanks)** [05]

1.2a What is the point group of HCl?

1.2b In group theory what is meant by symbol center of symmetry (i)?

1.2c Cyclobutene contains a _____ principal rotation axis. (6-fold/4-fold)

1.2d Give any two examples of ionic solvents.

1.2e Oxidizing action of various oxidizing agents is _____ in liquid ammonia than aqueous solutions(Weaker/Stronger)

Q.2 **Short Notes (Attempt any two)** [06]

A Write a note on precipitation reactions of Liq. ammonia.

B Explain the advantages and disadvantages of Liq.SO_2 as a solvent.

C Determine the point group of C_5H_5.

Q.3 **Explain in detail (Attempt any two)** [14]

A What is meant by the symbols (a) E, (b) σ, (c) Cn and (d) Sn? What is the distinction between planes labelled σ_h, σ_v, and σ_d?

B Determine the point group of H_2O. Draw the character table for C_2V point group.

C Explain Acid-Base reactions in Liq. ammonia.

Section-II (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a The chemical reactivity of lanthanides resembles

A Aluminum
B Chromium
C Calcium
D All of the above

1.1b Which of the following is man-made lanthanide

A Promethium
B Neodymium
C Europium
D All of the above

1.1c Actinides are

A Radioactive
B Nonradioactive
C few radioactive
D None of the above

1.1d The _____oxidation state is prominent and predominant in both lanthanides and actinides

A +3
B +2
C +4
D None

1.1e Which of the following oxidation state is not shown by Thorium

A +2
B +3
C +4
D +5

1.1f The atomic number of Americium is

A 94
B 95
C 96
D 97

1.1g Which of the following is not the isotope of Uranium

A ^{234}U
B ^{235}U
C ^{237}U
D ^{238}U

1.1h The _____of lanthanoid complexes is the reason they are used as phosphors on TV screens and fluorescent lighting.

A Fluorescence
B luminescence
C Phosphoresces
D None

1.1i The color of lanthanides is associated with _____

A f-f transition
B d-d transition
C Both
D None

1.1j Ability of actinides to form a complex compound is_____ than lanthanides.

A Lower
B Higher
C Medium
D None

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a Magnetic behavior in case of _____ arises due to the contribution of both spin moment as well as orbital magnetic moment.

1.2b The atomic size of the elements _____ from Ce to Lu (decrease/increase)

1.2c In Lanthanides, acidic nature is _____ with increasing atomic number. (decreases/increases)

1.2d Write the electronic configuration of Europium (Z=63).

1.2e What are the oxidation states shown by Thorium?

Q.2 Short Notes (Attempt any two) [06]

A Explain the physical properties of lanthanide.

B Write a short note about the oxidation states shown by Lanthanides.

C Discuss the difference between Lanthanides and Actinides.

Q.3 Explain in detail (Attempt any two) [14]

A Write a detail note on the methods for the purification and extraction of Uranium.

B Describe the magnetic and spectral properties of lanthanides.

C Explain in details about the Lanthanide contraction.