M.Sc. Examination 2019

Semester-IV

Chemistry

Course: CH-1020

(Optional: Inorganic Chemistry)

Time: Three Hours **Full Marks: 40**

Questions are of equal value or as indicated in the margin.

Answer ***any four*** questions.

1. a) "μ_J and μ_S values for La^{3+}, Gd^{3+} and Lu^{3+} ions are same" – Justify the statement with proper explanation.
   b) "+3 oxidation state of Lanthanide elements are well known" – Explore the statement with proper example.
   c) Write a short note on 'Actinide Carbonyls'.
   d) What do you mean by uranocene? 3+3+3+1=10

2. a) Show the different vibrational modes of CCl_4 molecule. Give the Raman spectral features of CCl_4 molecule.
   b) Explain the role of mutual exclusion principle associated to the Raman spectral pattern of CO_2 molecule.
   c) Discuss about the Raman spectral property of CS_2 molecule. (4+2)+2+2=10

3. a) Write about the role of samarium complex in the organic synthesis.
   b) How does CFC affect ozone layer?
   c) What is PAN? How is it formed photochemically?
   d) "CO_2 is mainly responsible for global warming" – Justify. 2+2+(1+2)+3=10

4. a) How does acid rain form?
   b) Write a short note on "COD of a water sample".
   c) What do you mean by "Eutrophication"?
   d) Write the Arsenic toxicity for us. 2.5+2.5+2.5+2.5=10

5. a) What do you mean by Osmotic flow? Give the potential energy profile with interparticle separation with change in electrolyte concentration in electrostatic stabilization of nanoparticle.
   b) How can you determine the size of a nanoparticle using Brus cavation?
   c) What is supperparamagnetism? What are the characteristic features of superparamagnitic system? What is blocking temperature? (2+2)+3+(1+1+1)=10

6. a) What is Langmuir-Schaefer film?
   b) Briefly describe the shape dependence of surface Plasmon band.
   c) Comment on the catalytic activity of bulk and nano-sized gold.
   d) Mention some important applications of nanomaterials.
   e) Write about 'CO' toxicity for us.
   f) Write about waste water treatment. 1+1.5+2+1.5+2+2=10

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