

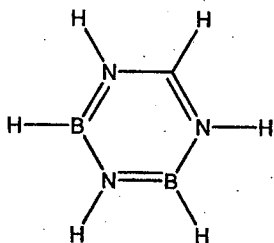
Uva Wellassa University, Sri Lanka
End Semester Examination – July 2010
CHE 341-2 Advanced Inorganic Chemistry (Repeat)

Time: Two (02) hours

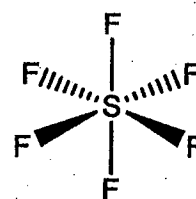
Total five (05) questions
Answer four (04) questions only
Question 01 is compulsory

01) List all the symmetry elements in each molecule, hence deduce the point groups to which these molecules belongs.

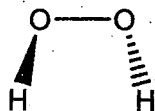
I. Borazine



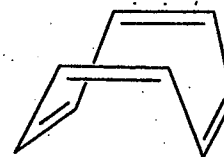
II. SF₆



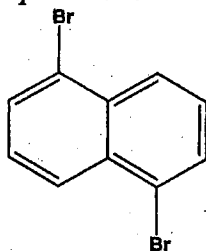
III. H₂O₂



IV. Cyclooctatetraene



V. 1,5-dibromonaphthalene



(40 marks)

02) I. Draw stereographic projections of the following point groups.

- C₄
- D_i
- C_{4v}
- D₄

(16 marks)

II. What is an Abelian group?

(04 marks)

- 03) I. Write the IUPAC name for the following organometallic compounds.
- $[\text{ReO}_3(\text{Me})]$
 - $[\text{Cr}(\eta^3 - \text{C}_3\text{H}_5)_3]$
- (04 marks)
- II. a. Draw the structure of $[\{\text{Fe}(\eta^5 - \text{C}_5\text{H}_5)(\text{CO})(\mu_2 - \text{CO})\}_2]$.
- b. What do the symbols μ and η denote in this compound?
- (04 marks)
- III. Show that $[\text{Fe}_2(\text{CO})_8]^{2-}$ obeys the 18 electron rule and can achieve stability through either of two structures.
- (04 marks)
- IV. Consider the isocyanide ($\text{C}\equiv\text{NR}$, sometimes called isonitrile) and nitrile ($\text{N}\equiv\text{CR}$) ligands that are isomers of one another.
- Sketch out a Lewis dot diagram for each showing the location of the lone pair(s) and any formal charges based on organic valence conventions.
 - Which ligand is the better σ -donor? Explain why?
 - Which ligand is the better π -acceptor? Explain why?
- (08 marks)
- 04) I. a. Classify silicates according to their arrangement of SiO_4^{2-} tetrahedra in space.
- b. Draw the structures of any three types of silicates you mentioned in part a.
- (10 marks)
- II. a. Give three types of sheet silicates (phyllo-silicate).
- b. Compare and contrast the structures of kaolinite androphyllite.
- (10 marks)
- 05) I. a. What are boranes? Briefly explain the nature of bonding in the hydrogen bridge in boranes.
- b. According to the structure of borane they can be classified into four groups. Name three of them.
- (08 marks)
- III. Determine the valence electron count and draw the structures of the following boranes.
- B_5H_9
 - B_5H_{11}
- (12 marks)