



EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE – PROPER

SECOND SEMESTER 2004/2005 (OCTOBER 2006)

CH 305 ORGANOMETALLIC CHEMISTRY AND NON-AQUEOUS SOLVENTS

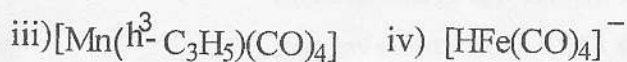
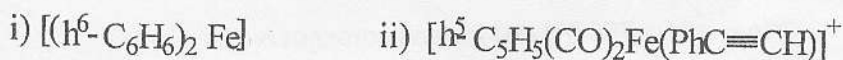
Time allowed: **ONE Hour**

Candidate must NOT start writing their answers until told to do so

1. a) What is meant by the term 'organometallic compound'. (15 marks)
- b) Would you expect the strength of the C-O bond in a metal carbonyl complex to be greater or less than that of carbon monoxide? Give reasons for your answer. (20 marks)
- c) Consider a linear carbonyl complex such as OC-M-CO. Explain the changes in CO stretching frequency when,
- One CO is replaced by triethylamine.
 - It gets a positive charge
 - It gets a negative charge
- (45 marks)
- d) Discuss the similarities and dissimilarities between CO and NO. (20 marks)

2. a) Cyclopentadiene displaces the CO molecule/s from iron pentacarbonyl ($\text{Fe}(\text{CO})_5$) to give two products **A** and **B**. Proton magnetic resonance spectrum of the product **A** consist of a single peak at τ 5.6 where as product **B** consist of 4 peaks of relative intensity 1:5:2:2 at τ 6.5, 5.6, 4.5 and 3.5 respectively. The Infrared spectrum of **B** showed strong absorption at 2000 cm^{-1} . Suggest a structure for each of these products **A** and **B**. (12 marks)

- b) What is meant by EAN (Effective Atomic Number) rule? Indicate whether the following organometallic compounds obey the EAN rule.



(20 marks)

- c) (i) What is meant by the following terms.

- Acidic solvents
- Aprotic solvents

Briefly discuss each with one example.

(20 marks)

- (ii) What are ammoniation and ammonolytic reactions? Discuss with examples.

(20 marks)

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- d) (i) Write down the Born-Haber cycle for the hydrolytic ($\Delta H_S(\text{NaCl})$) process of a solute (NaCl) in terms of its lattice energy (ΔH_L) and solvation energies of cation (Na^+) and anion (Cl^-) (20 marks)
- (ii) What is the condition for $\Delta H_S(\text{NaCl})$ to be negative? (08 marks)

End