



SCHOOL OF ADVANCED SCIENCES
Department of Chemistry
FALL Semester 2022-23
CAT -1

Course Code : BCHY101L
Course Name : Engineering Chemistry
Slot : E2 +TE2
Date: 10th November 2022

Duration : 90 minutes.
Max. Marks : 50

Time: 02.00 - 3.30 PM

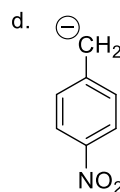
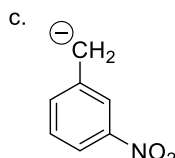
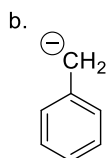
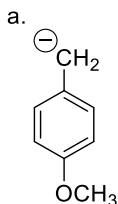
Answer all questions

- 1)** Using VBT and CFT discuss the bonding in $[\text{Co}(\text{CN})_6]^{3-}$ and predict its magnetic property.

VBT – 4 marks, CFT – 5 marks, Magnetic -1
(10 marks)

- 2)a** Arrange the following carbanions in decreasing order of stability.

Justify. **(5 marks)**



d , c ,b, a - sequence 2 marks, reason- OCH3 destabilize a, d –I effect & resonance effect of p nitro most stable, c – I effect of NO₂, b –no effect 3 marks

- b)** What are the factors that stabilize tertiary free radical and benzyl free radical? (5 marks)

tertiary free radical – 9 alpha hydrogens hyper conjugative effect – 2.5

benzyl free radical- resonance effect , delocalization of positive charge 2.5

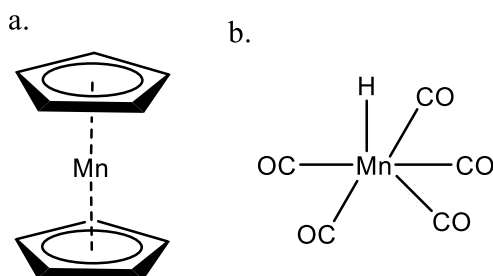
- 3) a)** Illustrate with an example each for the application of coordination complexes in hydrogenation of olefins and analytical chemistry

hydrogenation of olefin- Wilkinson – 2.5

Ni DMG or EDTA hardness – 2.5

(5 marks)

b) State 18 electron rule. Comment on the stability of the following compounds while applying the rule (5 marks)

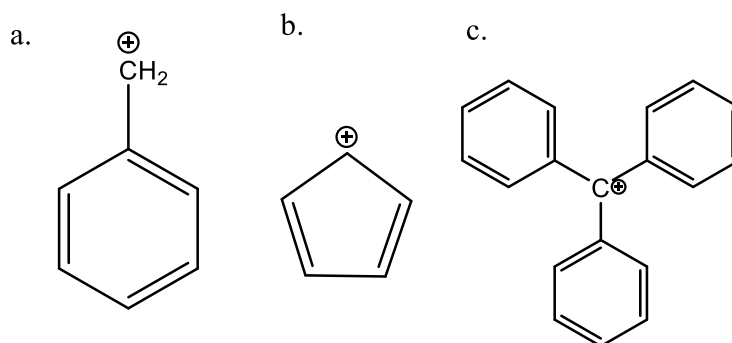


rule -1 mark, Dibenzene Mn – Cp 6 + Cp 6+ Mn 5 = 17 , not stable 2

Mn (CO)₅H - Mn (+1) – 6, H-2 , 5CO x 2 = 10 total 18 stable 2

4) a) Arrange the following carbocations in increasing order of stability. Justify.

(5 marks)



Ans: b , c, a -1 , c – though hyperconjugation and resonance it is non aromatic , a – resonance, b- no stabilization - 4 marks

b) Write down the synthesis of an analgesic with mechanism

synthesis- 2 marksm mech- 3 marks (5 marks)

4) a) What are the structural features and the function of the bioinorganic coordination compound containing Mg?

Structural features -3 marks, function – 2 marks

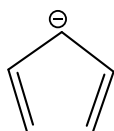
(5 marks)

b) Classify the following into aromatic / anti aromatic / non aromatic and indicate the stability order **(5 marks)**

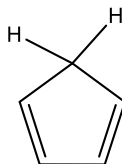
a.



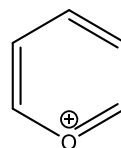
b.



c.



d.



Ans: a. Antiaromatic

b. Aromatic

c. Non aromatic

d. Aromatic

Stability order $b > d > c > a$

Classification – 2 marks, stability order – 1, explanation – 2 marks