



Department of Chemistry
Indian Institute of Technology Patna

End semester Examination

Spring Semester-2018

Course Title: Introductory Chemistry

Course No. CH 103

Full Marks: 40

24/04/2018

Time: 180 minutes

All questions are compulsory

(1) What catalyst can be used for the following reaction?

1



(2) Define cofactor and prosthetic group with one example in each case.

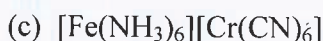
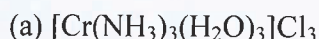
2+2

(3) Define bridging ligand. Give one example.

1+1

(4) Give the systematic names for the following coordination compounds (indicate oxidation state of central metal ion in each case)

3



(5) Determine the configuration (in the form $t_2^m e_g^n$ or $e^m t_2^n$, as appropriate), the number of unpaired electrons, and the ligand field stabilization energy as a multiple of Δ_o or Δ_T for each of the following complexes using the spectrochemical series to decide, where relevant, which are likely to be strong-field and which weak-field. (a) $[\text{Co}(\text{NH}_3)_6]^{3+}$; (b) $[\text{Fe}(\text{OH}_2)_6]^{2+}$; (c) $[\text{Fe}(\text{CN})_6]^{3-}$; (d) $[\text{FeCl}_4]^{2-}$ and (e) $[\text{Ni}(\text{CO})_4]$.

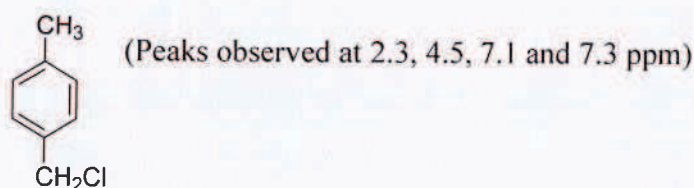
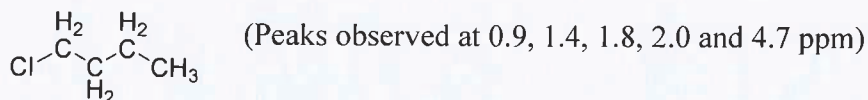
5×2 = 10

(6) Draw the MO diagram for $[\text{Co}(\text{CO})_6]^{3+}$.

3

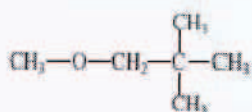
(7) Draw the ^1H NMR spectra for following two compounds

3×2 = 6

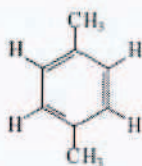


(8) Write the number of chemically equivalent proton in the following structures: 2

(a)



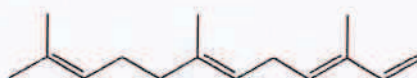
(b)



(9) Why coconut oil has a higher melting point than mustard oil?

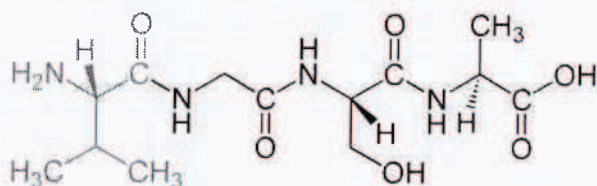
2

(10) What is isoprene rule? Show that the rule is followed for the following terpene. 1+2



(11) Find out which amino acids are joined together through amide bond to form the following peptide (one is already indicated)?

2



(12) Write down the structure of Maltose and Cellobiose.

2