

(7 pages)

Reg. No. :

Code No. : 6408

Sub. Code : ZCHM 32

M.Sc.(CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Third Semester

Chemistry – Core

SPECTRAL METHODS – I ORGANO METALLIC AND
ANALYTICAL METHODS

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- The energy of He(I) is _____
(a) 21.21 eV (b) 21.21 MeV
(c) 40.2 eV (d) 1457 eV
- ESCA gives sufficient chemical information up to a depth about _____ Armstrong in metals.
(a) 5-20 (b) 15-40
(c) 40-100 (d) 100-200

- Which of the following complex has a highest oxidation state of metal?

- $(\eta^6 - C_6H_6)_2Cr$
- $Mn(CO)_5Cl$
- $Na_2[Fe(CO)_4]$
- $K[Mn(CO)_5]$

- Which of the following is the neutral complex which follows the 18- electron rule?

- $(\eta^5 - C_5H_5)Fe(CO)_2$
- $(\mu^5 - C_5H_5)_2Mo(CO)_3$
- $(\eta^5 - C_5H_5)_2Co$
- $(\eta^5 - C_5H_5)_2Re(\eta^6 - C_6H_6)$

- Which metal centre does not obey the 18-electron rule?

- Fe in $Fe(\eta^5 - C_5H_4COMe)_2$
- CO in $Co_2(CO)_8$
- Ru in $[Ru(\eta_6 - C_6Me_6)_2]^+$
- V in $V(CO)_6$

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6. Which statement about ferrocene is incorrect?
- (a) I_2 oxidizes ferrocene to give a diamagnetic cation
 - (b) The ligands in ferrocene undergo electrophilic substitution with $RCOCl$ in the presence of a Lewis acid
 - (c) The Fe centre in ferrocene can be protonated by treatment with concentrated H_2SO_4
 - (d) In the gas phase, the C_5H_5 rings in ferrocene are eclipsed
7. What is meant by hydroformylation reaction?
- (a) Reaction of olefins
 - (b) Reaction of Azos
 - (c) Reaction of aromatics
 - (d) All of the mentioned
8. In which process hydroformylation of olefin to an aldehyde occurs?
- (a) Azo process
 - (b) Alkyl process
 - (c) Oxo process
 - (d) None of the mentioned

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9. In thermogravimetric analysis, the result obtained appear as a _____
- (a) Continuous chart
 - (b) Continuous parabola
 - (c) Continuous circular positions
 - (d) Discontinuous chart
10. The purpose of secondary filter in fluorescence spectroscopy is
- (a) Allows only excitation radiation
 - (b) Allows only emission radiation
 - (c) Allows both excitation and emission radiations
 - (d) Allows transmitted radiation

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write a note on absolute configuration of chelate complexes from ORD.
- Or
- (b) Explain the effect of solvent polarity in CT spectra.

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[P.T.O.]



12. (a) Write briefly about PE spectra of oxygen molecule.

Or

- (b) Write a note on types of PES.

13. (a) Write briefly about synthesis of metal complexes with allyl systems.

Or

- (b) Write a note on synthesis and reactions of ferrocene.

14. (a) Write briefly about Cluster compounds in catalysis.

Or

- (b) Write briefly about water gas shift reactions.

15. (a) Write the principles of TGA.

Or

- (b) Write the steps involved in emission spectroscopy based on plasma sources.

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PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Write a note on Hunds rules and selection rules.

Or

- (b) Discuss the construction of Orgel diagram of octahedral d^2 -ion.

17. (a) Discuss the UV Photoelectron spectra of Nitrogen molecule.

Or

- (b) Discuss the principle applications of Auger electron spectroscopy.

18. (a) Explain ionic versus covalent bonding in metallocenes.

Or

- (b) Discuss the structure features of metal complexes with alkene and alkyne systems.

19. (a) Explain Tolman catalytic loop and Fischer Tropsch process.

Or

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(b) Ziegler – Natta polymerization and mechanism of stereo regular polymer synthesis

20. (a) Discuss the steps in Thermometric titrations.

Or

(b) Discuss about principle and applications of spectrofluorimetry.

