

**2021/TDC(CBCS)/EVEN/SEM/
CHMHCC-601T/054**

**TDC (CBCS) Even Semester Exam.,
September—2021**

CHEMISTRY

(6th Semester)

Course No. : CHMHCC-601T

(Inorganic Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

SECTION—A

(Marks : 20)

Answer any ten questions : 2×10=20

1. Define organometallic compounds. Give one example of mixed organometallic compound. 1+1=2
2. Give one example each of dihapto and trihapto ligands. 1+1=2

(2)

3. With the help of EAN rule, explain the stability of $Mn_2(CO)_{10}$ complex.
4. Does ferrocene exhibit aromatic character? Explain.
5. Give the formula of two organometallic compounds having multicentre bonding.
6. What is Grignard reagent? Give one example.
7. Discuss the structural features of trialkyl aluminium.
8. What do you mean by Schlenk equilibrium?
9. Define electrophilic substitution reaction in octahedral complexes. Give a suitable example. 1+1=2
10. Define *trans*-effect. Out of Cl and C_2H_4 , which one is stronger *trans*-directing ligand? 1+1=2
11. What do you mean by kinetic inertness?
12. Explain associative (A) mechanism in inorganic reaction.

(3)

13. What is Wilkinson's catalyst?
14. What is hydroformylation reaction? Name the catalyst used for such reaction. 1+1=2
15. Write the composition of water gas.
16. What type of product is obtained by Fischer-Tropsch process? Which mechanism has been the best suitable for such process? 1+1=2
17. When does a substance get precipitated in solution?
18. Define solubility product. What is the effect of temperature on solubility product? 1+1=2
19. Explain why in the presence of HCl, Zn^{2+} ions cannot be precipitated as ZnS while Cu^{2+} ions can be precipitated as CuS.
20. What is buffer solution? Illustrate with an example.

(4)

SECTION—B

(Marks : 30)

Answer any *five* questions : 6×5=30

21. (a) What is meant by hapticity of a ligand?
How is it designated? 1+1=2
- (b) Give the classification of organometallic
compounds on the basis of nature of
bonding. Give one example of each type. 4
22. (a) What is EAN rule? Give one example of
metal carbonyl which obeys EAN rule.
1+1=2
- (b) Discuss bonding in metal carbonyl
complexes. 4
23. Taking suitable example, explain about
organometallic compounds exhibiting multi-
centre bonds. 6
24. What is Ziegler-Natta catalyst? Explain the
different steps involved in the synthesis of
polyethylene from ethylene in the presence
of this catalyst. 1+5=6

(5)

25. (a) Explain *trans*-effect in the light of electrostatic polarization theory. 3
- (b) Use the *trans*-effect series to suggest synthetic routes to *cis*- and *trans*- $[\text{PtCl}_2(\text{NH}_3)_2]$ from $[\text{Pt}(\text{NH}_3)_4]^{2+}$ and $[\text{PtCl}_4]^{2-}$. 3
26. (a) What is an inert ligand? What type of intermediate is formed if the inert ligand is a pi-acceptor? 1+1=2
- (b) Discuss briefly $S_N1(\text{CB})$ mechanism for the following reactions : 4
- (i) $[\text{Co}(\text{en})_2(\text{NH}_3)\text{Cl}]^{2+} + \text{OH}^- \longrightarrow$
- (ii) $[\text{Co}(\text{en})_2(\text{NH}_3)(\text{OH})]^{2+} + \text{Cl}^- \longrightarrow$
27. Give the mechanism of homogeneous hydrogenation of alkene using Wilkinson catalyst. 6
28. Explain the catalytic pathway (co-catalyst) involved in hydroformylation reactions. 6
29. What are interfering acid radicals and how do they interfere? Explain, in detail, the method of removal of PO_4^{3-} interfering radical. 1+1+4=6

(6)

30. (a) What are group reagents? What are the advantages of using the group reagents in qualitative analysis? 1+2=3
- (b) Explain how common-ion effect determines the degree of dissociation of a weak electrolyte. 3
