THE OPEN UNIVERSITY OF SRI LANKA
B. Sc. & B. Ed. DEGREE/STAND ALONE
COURSES IN SCIENCE Level 5 – 2013/2014
ASSIGNMENT TEST I (NBT)
CMU3122/CME5122 – Organometallic Chemistry

DURATION : 1 hour

DATE: 26 February 2014 (Wednesday) TIME : 11.00 a. m. – 12.00 noon

ANSWER ALL QUESTIONS

Select the **most correct answer** to each question given below. Mark a cross (X) over the most suitable answer on the **given answer script**. Any answer with more than one cross will not be counted.

PART A (45 marks)

1. Consider the following organic compounds

(i) C_2H_4 (ii) C_4H_4 (iii) benzene

The **possible *dihapto*** ligand/s is/are

1) (i) only. 2) (i) and (ii) only. 3) (i) and (iii) only.
4) (ii) and (iii) only. 5) (i), (ii) and (iii).

2. The possible **coordination mode(s)** of $C_3H_5^-$ is/are?

1) η^1 only. 2) η^1 and η^2 only 3) η^1 and η^3 only
4) η^2 and η^4 only. 5) η^1, η^3 and η^5 only.

3. Which one of the following ligands is **not isoelectronic** with CO?

1) CS 2) N_2 3) HC≡CH 4) CN^- 5) NO^+

4. The IUPAC name of $[NiCl(\eta^3\text{-}C_3H_5)(CO)_2]$ is

1) Chlorodicarbonyl(trihaptocyclopentadienyl)nickel
2) (η^1-Allyl)dicarbonylchloronickel
3) Chloro(η^3-allyl)dicarbonylnickel(II)
4) (η^1-Allyl)dicarbonylchloronickelate
5) Dicarbonylchloro(η^3-vinyl)nickel

5. An **LX** type ligand is

1) σ-allyl 2) η^3-$C_3H_5^-$ 3) η^2-C_4H_4 4) CH_3Cl 5) η^5-$C_5H_5^-$

6. The strongest π-acceptor ligand is

1) CN 2) PCl_3 3) PF_3 4) PPh_3 5) PMe_3

7. According to **covalent model,** which one of the following is **not** a 3e-donor ligand?

1) η^1-C_3H_5 2) carbene 3) π-allyl 4) ≡CPh 5) linear NO

8. Consider the following statements

(i) PMe_3 is a better π-acceptor than PPh_3.
(ii) CO is a better σ-donor than CS.
(iii) CN^- is a better σ-donor than CO.

The **correct** statement/s is/are

1) (iii) only 2) (i) & (ii) only 3) (i) & (iii) only
4) (ii) & (iii) only 5) (i), (ii) & (iii)

9. The **coordination number** of Ni in $[NiCl(\eta^3\text{-}C_3H_5)(CO)_2]$ is

1) 2 2) 3 3) 4 4) 5 5) 6

10. Consider the following statement/s regarding oxidative addition.

(i) Coordination number of the metal is increased by two units during oxidative-addition.
(ii) Oxidative-addition is facile if the metal centre is electron rich.
(iii) Coordinatively saturated compounds can undergo oxidative addition.

The **correct** statement/s is/are,

1) (i) only 2) (i) and (ii) only 3) (ii) and (iii) only
4) (i) and (iii) only 5) (i), (ii) and (iii)

11. What is the **Valence Electron Count (VEC)** of Ni in $[NiCl(\eta^3\text{-}C_3H_5)(CO)_2]$? (Group number of Ni is 10)

1) 16 2) 17 3) 18 4) 19 5) 20

12. Which statement is **true** about $[Co_2(CO)_8]$?

1) Co is a Group 8 metal.
2) There is no Co–Co bond in the complex.
3) In the solid state it has eight terminal ligands.
4) There is no bridging carbonyl ligand in solution.
5) Each Co centre does not obey 18e rule.

13. Due to back donation in metal carbonyls,

1) the σ–character of the M–CO bond is increased.
2) M–CO bond order is increased.
3) the bond strength of C–O is increased.
4) the M–CO bond length is increased.
5) None of the above is correct.

14. What is the d^n for Fe^{2+} ? (Atomic number of Fe is 26)

1) d^2 2) d^5 3) d^6 4) d^7 5) d^8

15. Consider the following statement/s about **Fischer-carbenes**.

(i) Metal is in a high oxidation state.
(ii) Metal is a late transition metal.
(iii) Carbene carbon is nucleophilic.

The **correct** statement/s is/are

1) (ii) only 2) (i) and (ii) only 3) (ii) and (iii) only
4) (i) and (iii) only 5) (i), (ii) and (iii)

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B. Sc DEGREE PROGRAMME 2013/2014
CMU4122/CME5122 – ORGANOMETALLIC CHEMISTRY- LEVEL 5
ASSIGNMENT TEST-I (Part A)

MCQ ANSWER SHEET: Mark a cross (X) over the most suitable answer.

Part A	
Part B	
Total %	

Reg. No.:

For Examiners Use

Marks

Correct Answers		
Wrong Answers		
Total		

1.	1	2	3	4	5
2.	1	2	3	4	5
3.	1	2	3	4	5
4.	1	2	3	4	5
5.	1	2	3	4	5
6.	1	2	3	4	5
7.	1	2	3	4	5
8.	1	2	3	4	5
9.	1	2	3	4	5
10.	1	2	3	4	5
11.	1	2	3	4	5
12.	1	2	3	4	5
13.	1	2	3	4	5
14.	1	2	3	4	5
15.	1	2	3	4	5

Part B (55 marks)
Answer all the questions in the space provided. Attached sheets will not be graded.

1. (a) Give the IUPAC name for $[FeCl_2(\eta^2\text{-}C_2H_4)(\eta^6\text{-}C_6H_6)]$.

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(b) Draw the structure of $[FeCl_2(\eta^2\text{-}C_2H_4)(\eta^6\text{-}C_6H_6)]$.

(c) Determine the **VEC** of Fe in $[FeCl_2(\eta^2\text{-}C_2H_4)(\eta^5\text{-}C_5H_5)]$ using **covalent model**. (Indicate your break down; Group number of Fe is 8)

(d) Determine the **coordination number** of Cr in $[CrBr(\eta^3\text{-}C_3H_5)(CO)_2(\eta^4\text{-}C_4H_4)]$.

(e) Draw the **structures** of **geometrical** isomers of $[FeCl_3(PF_3)(CO)_2]$.

(f) Arrange NMe_3, NH_3, N_2 and H_2O in the order of increasing σ-donor ability.