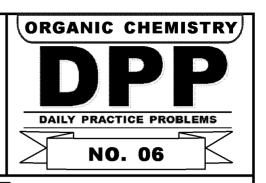


**TARGET: JEE (ADVANCED) 2015** 

Course: VIJETA & VIJAY (ADP & ADR) Date: 24-04-2015



## **TEST INFORMATION**

DATE: 26.04.2015

**CUMULATIVE TEST (CT) - 02** 

**Syllabus : Physical :** Mole concept, Equivalent Concept, Ionic equilibrium, Electrochemistry. **Inorganic:** Inorganic Nomenclature, Periodic table, Chemical bonding, Coordination compounds, s & p Block Element, Metallurgy. **Organic :** Organic Nomenclature, Isomerism, Stereoisomerism, GOC, POC, Tautomerism, Acids & Bases.

# DPP No. # 06 (JEE-ADVANCED)

Total Marks: 169 Max. Time: 137 min.

Single choice Objective (-1 negative marking) Q.1 to Q.15 (3 marks 2½ min.) [45, 37½] Multiple choice objective (-1 negative marking) Q.16 to Q.20 (4 marks, 3 min.) [20, 15] Assertion and Reason ('-1' negative marking) Q.21 to Q.23 (3 marks 2½ min.)  $[09, 7\frac{1}{2}]$ Comprehension (-1 negative marking) Q.24 to Q.32 (3 marks 2½ min.) [27, 221/2] Single Digit Subjective Questions (no negative marking) Q.33 to Q.40 (4 marks 2½ min.) [32, 20] Double Digits Subjective Questions (no negative marking) Q.41 (4 marks 2½ min.) [04, 21/2] Match the column (4 vs 4) (no negative marking) Q.42 to Q.43 (8 marks, 8 min.) [16, 16] Match the column (4 vs 5) (no negative marking) Q.44 to Q.45 (8 marks, 8 min.) [16, 16]

(A) 
$$\bigcirc$$
 C - CH<sub>3</sub> (B)  $\bigcirc$  COOH (C)  $\bigcirc$   $\bigcirc$  (D)  $\bigcirc$ 

2. 
$$COOH \xrightarrow{(I) PCI_5} [X] \xrightarrow{\triangle} Number of fractions (III) HCN (III) H3O+$$

Find X & total number of fractions:



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3. Me 
$$\xrightarrow{\text{Me}}$$
  $\xrightarrow{\text{OH}}$   $\xrightarrow{\text{H}_2\text{SO}_4}$   $\xrightarrow{\text{CH}_3\text{OH}, \text{H}_2\text{O}}$   $\times$ 

X is:

4. 
$$\underbrace{ \begin{array}{c} HNO_3 \\ H_2SO_4 \end{array}} N \xrightarrow{HNO_3} N \xrightarrow{(NH_4)_2S} O \xrightarrow{NaNO_2, HCI} P \xrightarrow{H_2O,} Q \xrightarrow{Sn, HCI} R$$

R is:

$$(A) \bigcirc H$$

$$(B) \bigcirc H$$

$$NH_2$$

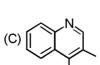
$$(C) \bigcirc NH_2$$

$$NH_2$$

$$(D) \bigcirc NH_2$$

- 5.  $Compound\,A\,(C_{10}H_{14}O)\,does\,not\,react\,with\,Br_2\,\,water,\,acetyl\,chloride\,or\,boiling\,NaOH\,solution.\,On\,reaction$ with excess of HI, A is converted into B ( $C_3H_7I$ ) and C ( $C_7H_7I$ ). B can be hydrolysed by aq. NaOH to D (C<sub>3</sub>H<sub>8</sub>O) which gives iodoform test. C can be oxidized to carboxylic acid E (C<sub>7</sub>H<sub>8</sub>O<sub>2</sub>) by chromic acid. Assign structures to A.
  - (A)  $Ph-CH_2-O-Pr$
- (B)  $Ph-CH_2-O-iPr$  (C) Ph-O-iPr
- (D)  $Ph-CH_2-CH_2-iPr$
- 6. A mixture of two aromatic compounds (A) and (B) was separated by dissolving in chloroform followed by extraction with aqueous KOH solution. The organic layer containing compound (A) when heated with alcoholic solution of KOH produced a compound C (C<sub>7</sub>H<sub>5</sub>N), associated with an unpleasant odour. The alkaline aqueous layer on the other hand, when heated with chloroform and then acidified gave a mixture of two isomeric compounds (D) and (E) of molecular formula  $C_7H_6O_2$ . Identify (A).
  - (A) PhNC
- (B) PhOH
- (C) Ph-NH<sub>2</sub>
- (D) Salisaldehyde

7. Which can be the product of the following reaction?



- **8. S**<sub>1</sub>: Diazocoupling in aniline is carried out in sightly acidic medium.
  - **S**<sub>2</sub>: Carbonyl compounds undergo electrophilic as well as nucleophilic addition reaction.
  - S<sub>3</sub>: Secondary amines give insoluble precipitate with aqueous alkaline PhSO<sub>2</sub>CI.
  - **S**<sub>4</sub>: Benzaldehyde reacts faster with grignard reagent than benzene-1,2-dicarbaldehyde.
  - (A) FTFT
- (B) TTFT
- (C) TTTF
- (D) TFTF

**9.** The intermediate of the following reaction is:

(A) 
$$\bigoplus$$
 NO

**10.** Consider the following sequence of reaction and identify the end product(R):

$$\begin{array}{c}
\text{COOH} \\
\text{CH}_2\text{Ph}
\end{array}
\xrightarrow{\text{SOCI}_2} P \xrightarrow{\text{AICI}_3} Q \xrightarrow{\text{Zn-Hg}} R$$

11. In the following sequence of reactions;

$$M \xrightarrow{OH^{\widehat{\square}}/\Delta} \xrightarrow{Ph} O$$

$$N \xrightarrow{OH^{0}/\Delta} PhCH_{2}OH + Ph-COO^{-1}$$

$$Q \xrightarrow{O_3} M + N.$$

The compound Q is:

## **12.** Observe the following reaction;

$$Br - CH_{2} - C - C - OH + Na_{2}CO_{3} \xrightarrow{\Delta} \begin{bmatrix} CH_{3}O \\ Br - CH_{2} & C - C & O \\ CH_{3} \end{bmatrix} \xrightarrow{CH_{2}} CH_{2} = C \xrightarrow{CH_{3}} CH_{3} + HBr + CO_{2}$$

What will be the product of following given reaction?

- (A) Ph CH = C COOH|
  Br
- (C) Ph CH = CH Br

- (B) Ph-C=CH<sub>2</sub> Br
- (D)  $Ph C \equiv C COOH$

## **13.** Predict the major product of given reaction.

$$\frac{N_2H_4/KOHH_2O}{\text{(Wolf-kishner reduction)}} \xrightarrow{\text{(A)}} \text{(A)}$$
; Product A is:

$$(A) \qquad \bigvee_{NO_2} OH \qquad O$$

(C) 
$$\bigcap_{NO_2}^{CI}$$

$$(D) \xrightarrow{OH} O$$

$$NO_{2}$$

14. 
$$\xrightarrow{H^+} (A), \text{ Product (A) is } :$$

, This conversion can be achieved by : 15.

- (A) Me<sub>2</sub>CO/H<sup>+</sup>, H<sub>2</sub>O<sup>⊕</sup>, KMnO<sub>4</sub>/HO<sup>-</sup>
- (B) Me<sub>2</sub>CO/H<sup>+</sup>, KMnO<sub>4</sub>,H<sub>3</sub>O<sup>+</sup>
- (C) KMnO<sub>4</sub>/NaO<sub>4</sub>, Me<sub>2</sub>CO/H<sup>+</sup>, H<sub>3</sub>O<sup>+</sup>
- (D) KMnO<sub>4</sub>/NalO<sub>4</sub>, H<sub>3</sub>O<sup>+</sup>, Me<sub>2</sub>CO/H<sup>+</sup>
- 16.\* Compound A (C<sub>5</sub>H<sub>7</sub>OCI) reacts rapidly with ethanol and catalytic amount of acid to form a plesant smelling substance, B  $(C_7H_{12}O_2)$ . A also reacts with  $H_2O$  to form C with neutralisation equivalent of 100. A, B and C all react with Br<sub>2</sub> water. Acid C, which can also be obtained by acidic hydrolysis of B is oxidised to new acid  $D(C_4H_6O_3)$  and  $CO_2$ . D on heating with soda lime gives acetone. Identify A to D.

(A) 
$$A = CH_3 - C - CH_2 - C - CI$$
  
 $CH_2 = O$ 

(B) 
$$B = CH_3 - C - CH_2 - C - OEt$$
  
 $CH_2$  O

(C) 
$$C = CH_3 - C - CH_2 - C - COOH$$
 (D)  $D = CH_3 - C - CH_2 - COOH$  (D)  $D = CH_3 - C - CH_2 - COOH$ 

(D) D = 
$$CH_3 - C - CH_2 - COOH$$

17.\* Identify A, B, C, D, E and F in the following:

$$A(C_7H_5NO_2CI_2) \xrightarrow{Sn + HCI} B$$

$$NaNO_2/HCI \qquad CAN$$

$$(Ceric Ammoium Nitrate) \qquad C (colour)$$

$$HNO_3/H_2SO_4 \longrightarrow G (single mononitro derivative)$$

(A) 
$$A = \bigcirc$$

$$CI \\ CH_2NO_2 \\ CI$$
(B)  $D = \bigcirc$ 

$$CI \\ CH_2OH \\ CI$$
(C)  $F = \bigcirc$ 

$$CI \\ CI$$

Identify A, B, C, and D in the following: 18.\*

$$D \xleftarrow{RCO_3H} C \xleftarrow{Li / NH_3} CH_3C \equiv CCH_3 \xrightarrow{Lindlar \ catalyst} A \xrightarrow{RCO_3H} B$$

- (A) D is Cis
- (B) D is trans
- (C) B is Cis
- (D) B is trans

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#### **19.** Primary (1°) amine group is formed in :

$$(A) \bigcirc NO_2 \longrightarrow NO_2$$

(B) 
$$\rightarrow NH_2 \xrightarrow{Br_2/KOH}$$

(C) 
$$CI \xrightarrow{CH_3NH_2/Cu_2O/\Delta}$$

# 20. $P_{2}O_{5} \rightarrow P$ $(i) Br_{2}+KOH+\Delta \rightarrow C$ $(ii) CHCl_{3}+OH^{-}+\Delta \rightarrow C$

Which statement(s) is/are correct:

- (A) Reduced product of P and Q will be metamers to each other.
- (B) By dry distillation of hydrolysed products of P with Ca(OH)<sub>2</sub>, gives benzophenone.
- (C) Hydrolysed product of Q, reacts with NaNO<sub>2</sub> + HCl followed by reaction with phenol, gives orange red dye.
- (D) Electrophile involved in the formation of Q is dichlorocarbene.

## 21. Statement-1: NaHSO<sub>3</sub> is used in seperation and purification of aldehydes.

Statements-2: NaHSO<sub>3</sub> is reducing agent.

- (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
- (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
- (C) Statement-1 is True. Statement-2 is False.
- (D) Statement-1 is False, Statement-2 is True.

#### **22. Statement-1**: CCI<sub>2</sub>CHO forms an isolable crystalline hydrate.

Statement-2: Electron withdrawing chlorine atoms stabilise hydrate by intramolecular H-bonding.

- (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
- (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
- (C) Statement-1 is True, Statement-2 is False.
- (D) Statement-1 is False, Statement-2 is True.

#### **23. Statement-1 :** CH<sub>2</sub>MgBr can not be prepared in cold aqueous solution.

Statement-2: Water molecules stablise grignard molecules by H-bonding.

- (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
- (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
- (C) Statement-1 is True, Statement-2 is False.
- (D) Statement-1 is False, Statement-2 is True.

#### Comprehension #1

Methyl red is commonly used as indicator for acid base titrations. It is prepared by treating  $NaNO_2/HCI$  with anthranilic acid and the resulting solution is mixed with N,N dimethylaniline and shaked well the solution for some minutes to get "Methyl Red".

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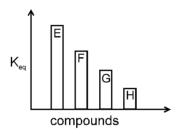
24. Which is most likely to be "Methyl Red"?

(A) 
$$\begin{array}{c} O \\ II \\ C-OH \\ -NH- \\ \end{array}$$
 (B)  $\begin{array}{c} COOH \\ N=N- \\ \end{array}$ 

- 25. The two organic materials anthranilic acid and N,N dimethylaniline used in preparation of methyl Red can be best distinguished by :
  - (A) HCl solution
- (B) Br, water
- (C) CHCI,/KOH
- (D) FeCI<sub>2</sub>

#### Comprehension # 2

The relative comparision of equilibrium constants of addition of RMgBr on four carbonyl compounds has been shown by the graph below.



- **26.** Which compound corresponds to H if the four given compounds are :
  - (A) P NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>CHO
- (B) C<sub>e</sub>H<sub>e</sub>CHO
- (C) P MeOC<sub>E</sub>H<sub>4</sub>CHO
- (D) CH, COCH, CH,
- **27.** Which compound corresponds to G if the four given compounds are :
  - (A) CH<sub>2</sub>CHO
- (B) C<sub>6</sub>H<sub>6</sub>COCH<sub>3</sub>
- (C) C<sub>E</sub>H<sub>E</sub>CHO
- (D) C<sub>e</sub>H<sub>e</sub>COC<sub>e</sub>H<sub>e</sub>

## Comprehension #3

$$Q \xrightarrow{R} S$$

$$\uparrow CO_2/OH^-$$

$$AICI_3 \qquad X \xrightarrow{O_2} Z$$

$$\downarrow CI_2/OH^-$$

$$W + CH_3COO^-$$

$$\downarrow W/OH^-$$

$$P$$

28. Which of the following compound is 'P'?

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29. S is a well known pain killer which of the following is 'R'?

#### Comprehension #4

Observe the following sequence of reaction

**30.** The product Y is

31. The product U is

32. Compound (Y) on reaction with CO<sub>2</sub>/NaOH followed by CH<sub>3</sub>–C–CI and pyridine produces :

**33.** Number of positions electrophilic substitution which takes place when salicylic acid is reacted with bromine water?

**34.** The number of stereoisomers of the product obtained in the following reaction is:

$$Ph-CH-CH=O + H_2N-NH \xrightarrow{Ph} Et \xrightarrow{H^{\oplus}} Me$$

$$(+)$$

$$(+)$$

35. In the following sequence of reaction number of Nucleophilic substitution is:

36. 
$$\begin{array}{c} H \\ \hline (1) O_2/\Delta \\ \hline (2) \text{ dil. } H_2 \text{SO}_4/\Delta \end{array}$$
?

Total number of organic products formed (major, minor all).

37. 
$$O_3 \longrightarrow NH_2OH/H^{\oplus} \longrightarrow excess$$

The total number of isomeric products (including stereomers) formed at the end of the reaction is:

38. How many aromatic diazonium chlorides of xylene can be reduced to meta-xylene by H<sub>2</sub>PO<sub>2</sub>?

$$\begin{bmatrix}
CH_3 \\
CH_3
\end{bmatrix}
\xrightarrow{H_3PO_2, \Delta} (m-Xylene)$$

**39.** Find the total number of groups with which the Grignard Reagent (CH<sub>3</sub>MgBr) can react.

**40.** How many types of Grignard reagent can be used to prepare the following alcohol, by using different Ketones.

41. Observe the following reaction,

$$\text{'X'} \xrightarrow{\text{NH}_2\text{OH.HCI}} \xrightarrow{\text{H}_2\text{SO}_4} \xrightarrow{\text{(2)}} \xrightarrow{\text{KOH, boil}} \xrightarrow{\text{H}^+ \text{Acidification}} \text{H}_2\text{N} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{COOH}_2 - \text{COOH}_$$

molecular mass of 'X' is:

42. Column-l

$$(A) \qquad \bigcirc \begin{matrix} CH=O \\ \hline \end{matrix} \qquad OH^{\ominus}$$

(p) Aromatic ring substitution

(B) 
$$CH=O$$

$$CH_3CH=O/OH^{\Theta}$$

(q) Nucleophilic addition

(C) 
$$CH=O$$

$$\xrightarrow{HNO_3+H_2SO_4}$$

(r) Condensation reaction

(D) 
$$CH=O$$
  $KCN/H^{\oplus}$ 

(s) Formation of more than one organic products

43. Match the column

Column I

#### Column II

(A) MeCO(CH<sub>2</sub>)<sub>4</sub>COMe 
$$\xrightarrow{\text{(i) OH}^{\oplus}}$$

(B) 
$$(CH_2)_4$$
  $CO_2Et$   $\xrightarrow{OEt}$   $CO_2Et$ 

(D) PhCOCOPh  $\xrightarrow{\text{OH}^{\Theta}}$ 

#### 44. Column-I (Reactions)

$$(A) \bigcirc \xrightarrow{HNO_3} \xrightarrow{H_2SO_4}$$

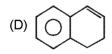
$$(A) \bigcirc \xrightarrow{\text{CI}} \xrightarrow{\text{HNO}_3}$$

$$(B) \bigcirc \stackrel{\mathsf{NO}_2}{\longrightarrow} Cl_2/\mathsf{Fe} \longrightarrow$$

$$(C) \bigcirc \longrightarrow Conc.H_2SO_4 \longrightarrow CH_3$$

$$\text{(D)} \overbrace{\bigcirc}^{\text{CH}_3} \xrightarrow{\text{C}_2\text{H}_5\text{OH/H}^{\oplus}}$$

#### Column - I 45. (Compounds)



## Column-II (Features)

(p) 
$$K_H/K_D = 1$$

(q) 
$$K_H/K_D > 1$$

- (r) Deactivated reactant
- (s) Ortho and para substituted products are major
- (t) Meta substituted product is major.

# Column - II (Type of possible reactions)

- (p) Nucleophilic addtion
- (q) Aliphatic nucleophilic substitution

- (r) Elimination
- (s) Electrophilic addition reaction
- (t) Electrophilic substitution reaction



# Solution of DPP #6

TARGET: JEE (ADVANCED) 2015 Course: VIJETA & VIJAY (ADP & ADR)

# **CHEMISTRY**

1. 
$$X \xrightarrow{P_4O_{10}} \langle \bigcirc \rangle$$
  $CN \xrightarrow{MeMgBr} \langle \bigcirc \rangle$   $C \xrightarrow{Ca(OH)_2} \langle \bigcirc \rangle$   $COOH$ 

7. 
$$\begin{array}{c|c} H \\ N : & Q \\ \hline \\ H & O \end{array} \begin{array}{c} (H^{\oplus}) \\ \hline \\ O \\ \hline \end{array} \begin{array}{c} (H_2O) \\ \hline \\ O \\ \hline \end{array} \begin{array}{c} -(H_2O) \\ \hline \\ O \\ \hline \end{array}$$

Nucleophilic addition-elimination reaction of amines with carbonyl compounds. The primary aromatic amine generates a quinoline derivative with  $\beta$ -diketones.

12. 
$$Ph - CH - CH - CH - CH - BH - CH = CH - BH - CH = CH - BH - CH - BH -$$

19. 
$$NO_{2} \longrightarrow NH_{2}$$

$$NO_{2} \longrightarrow NH_{2}$$

$$NO_{2} \longrightarrow NH_{2}$$

$$NO_{2} \longrightarrow NH_{2}$$

$$CI \longrightarrow NH_{2} \longrightarrow NH_{2}$$

$$CH_{3}NH_{2}/Cu_{2}O/\Delta \longrightarrow NH_{2}$$

$$\stackrel{\text{"NH}_2}{\longrightarrow} \stackrel{\text{NH}_2}{\longrightarrow}$$

20. 
$$\begin{array}{c|c} CN & CH_2-NH_2 \\ \hline \\ D_2O_5 & \hline \\ \hline \\ A & (P) & (Primary amine) \\ \hline \\ (I) Br_2+KOH & \hline \\ Hoffmann's & C & NH-CH_3 \\ \hline \\ Bormamide reaction & Carbylamine & (Q) & (Secondary amine) \\ \hline \\ Carbylamine & (Secondary amine) \\ \hline \end{array}$$

- **21.** NaHSO<sub>3</sub> on addition of carbonyl compound forms a salt.
- 22. Self explanatory.
- **23.** G.R. can not prepared in aqueous solution due to acid base reaction.

24. 
$$\begin{array}{c} COOH \\ NH_2 \\ \hline NaNO_2 + HCI \\ \hline \end{array}$$
 
$$\begin{array}{c} COOH \\ N_2^{\oplus}CI^{\oplus} \\ \hline \end{array}$$
 
$$\begin{array}{c} COOH \\ \hline \end{array}$$
 
$$\begin{array}{c} COOH \\ \hline N=N- \\ \hline \end{array}$$

**34.** The product is:

Ph – CH – CH = N – NH 
$$\stackrel{\text{Ph}}{\longrightarrow}$$
 Et Me

Me

I = (+, +) (E)

II = (+, +) (Z)

III = (-, +) (E)

IV = (-, +) (Z)

36. 
$$CH_3O \longrightarrow CH_3O \longrightarrow$$

37.  $\begin{array}{c} \text{Br} \\ \text{CI}^{\text{nur.}} \end{array} \xrightarrow{O_3} \begin{array}{c} \text{Br} \\ \text{CI}^{\text{nur.}} \end{array} \xrightarrow{\text{CH=O}} \begin{array}{c} \text{CH=O} \\ \text{NH}_2\text{OH}/\text{H}^{\oplus} \end{array} \xrightarrow{\text{excess}} \begin{array}{c} \text{Br} \\ \text{CI}^{\text{nur.}} \end{array} \xrightarrow{\text{CH=N-OH}}$ 

trans - trans cis R trans trans S cis

Total isomeric product = 4

38. (i) 
$$CH_3 \xrightarrow{H_3PO_2/\Delta} CH_3$$
 (ii)  $CH_3 \xrightarrow{H_3PO_2/\Delta} CH_3$  (iii)  $CH_3 \xrightarrow{H_3PO_2/\Delta} CH_3$  (iii)  $CH_3 \xrightarrow{H_3PO_2/\Delta} CH_3$  (iii)  $CH_3 \xrightarrow{H_3PO_2/\Delta} CH_3$ 

**39.** (C=O), (–OH), (C≡CH), (COOEt), (COOH) Total = 5

42. (A) 
$$OH^{\Theta}$$
  $CH_2OH$   $COOH$   $CH_2OH$   $COOH$ 

(D) 
$$\begin{array}{c} CH=O \\ \hline \\ KCN/H^{\oplus} \\ \hline \end{array} \qquad \begin{array}{c} CH \\ CH \\ \hline \end{array} \qquad \begin{array}{c} OH \\ (d+\ell) \\ \hline \end{array}$$

43. (A) Me-C-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-C-Me 
$$\xrightarrow{\text{intramolecular} \\ \text{aldol condensation}}$$
 Me  $\xrightarrow{\text{Me}}$   $\xrightarrow{\text{M$ 

- (C) Perkin's condensation reaction.
- (D) Benzil-Benzilic acid rearrangement.

Nu-addition on C=O group,

Electrophilic substitution on ring

Aliphatic Nu-substitution on C-Br, Elimination of R-X,

Electrophilic substitution on ring.

Aliphatic Nu-substitution on C-Br, Elimination of R-X

(D)

Electrophilic addition on C=C

Electrophilic addition on C=C

Electrophilic substitution on ring.