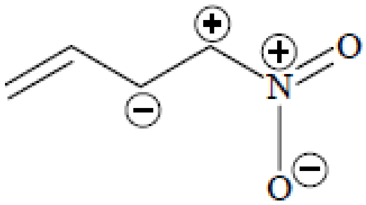
IIT-JEE-2007

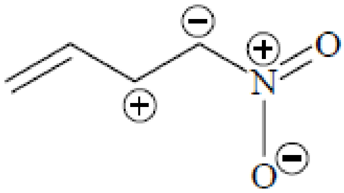
PAPER-II

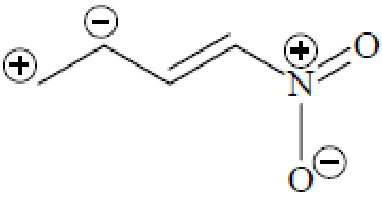
CHEMISTRY

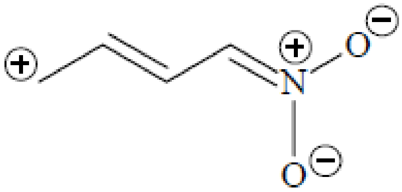
23. Solution: (A)

Same charges are present at nearest position (Less stable)

(A)


(B)


(C)


(D)


Hence (A) is correct

24. Solution: (A)

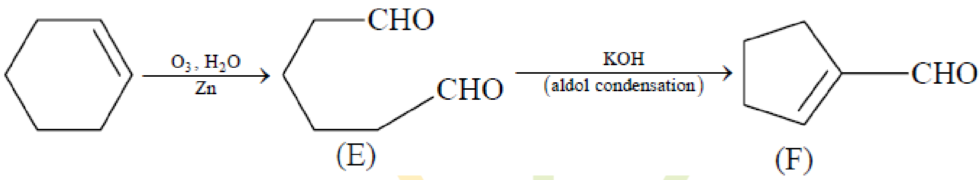
$$\underset{(1bar,\,373K)}{H_2O(g)} \rightleftharpoons \underset{(1bar,373K)}{H_2O(g)}$$

At $100°C$ $H_2O(l)$ has equilibrium with $H_2O(g)$ therefore $\Delta G = 0$.

Because liquid molecules are converting into gases molecules therefore $\Delta S = +ve$

Hence (A) is correct.

25. Solution: (A)



Hence (A) is correct.

26. Solution: (D)

$aG + bH \rightarrow Products$

$rate \propto [G]^a [H]^b$

$a = 1,\ b = 2$ a = 1, b = 2

Hence (D) is correct

27. Solution: (B)

(A) $Mn^+ = 3d^5 4s^1$ in presence of CO effective configuration $3d^6 4s^0$.

Three lone pair for back bonding with vacant orbital of C in CO.

(B) $Fe^0 = 3d^6 4s^2$ in presence of CO effective configuration $= 3d^8$ four lone pair for back bonding with CO.

(C) $Cr^0 = 3d^5 4s^1$

Effective configuration $3d^6$.

Three lone pair for back bonding with CO.

(D) $V^- = 3d^6 4s^2$ effective configuration $= 3d^6$ three lone pair for back bonding with CO.

Maximum back bonding is present in $Fe(CO)_5$ there for CO bond order is lowest here.

28. Solution: (C)

On position emission from nucleus, proton converts into neutron therefore atomic number decreases by one but atomic mass remains constant.

$$\frac{Atomic\ mass}{atomic\ number} = \frac{23}{10}$$

Hence (C) is correct.

29. Solution : (D)

$$Cr_2O_7^{2-} + Fe^{2+} \rightarrow Fe^{3+} + Cr^{3+}$$

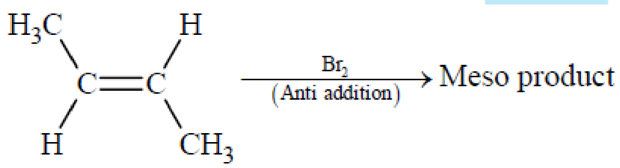
$$n\ factor\ of\ Cr_2O_7^{2-} = 6$$

$$n\ factor\ of\ Fe^{2+} = 1$$

So to reduce one mole of dichromate 6 moles of Fe^{2+} are required.

Hence (D) is correct.

30. Solution : (A)



Hence (A) is correct.

31. Solution : (B)

$$Hg^{2+} + KI \rightarrow HgI_2\,(\text{Red ppt.})$$

$$HgI_2 + \underset{(\text{excess})}{KI} \rightarrow H_2HgI_4$$

$$Hg^{2+} + Co(SCN)_2 \rightarrow \underset{\text{Soluble}}{Hg(SCN)_2}$$

$$g^{2+} + Co(SCN)_2 \rightarrow \underset{\text{blue crystalline precipiates}}{Hg(SCN)_2}$$

SECTION – II

32. Solution : (C)

33. Solution : (B)

Blue colour is due to solvated electrons.

34. Solution : (C)

35. Solution : (C)

$$C_6H_{12}O_6 + \textit{fehling solution} \rightarrow (C_6H_{11}O_7)^- + \underset{(\text{Red ppt})}{Cu_2O} \downarrow$$

SECTION – III

36. (C)

$$OH^{\ominus}_{aq} CHCl_3 \rightleftharpoons \overset{\ominus}{C}Cl_3 + H_2O$$

$$CCl_3^{\ominus} \rightarrow Cl^{\ominus} + :CCl_3$$

dichlorocarbene intermediate

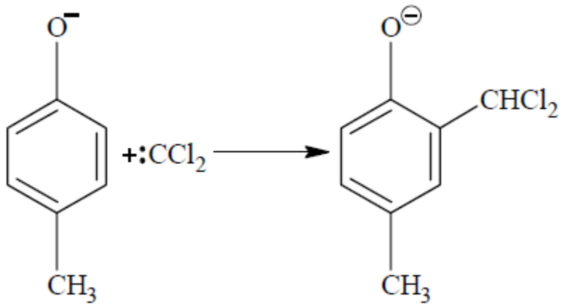
37. Solution : (C)

$$OH^{\ominus}_{aq} CHCl_3 \rightleftharpoons \overset{\ominus}{C}Cl_3 + H_2O$$

$$CCl_3^{\ominus} \rightarrow Cl^{\ominus} + :CCl_3$$

dichlorocarbene intermediate

38. Solution : (B)



39. Solution : (C)

Reduction potential of I_2 is less than Cl_2.

40. Solution : (D)

Reaction of Mn^{3+} with H_2O is spontaneous.

41. Solution : (A)

SECTION – IV

42. Solution: A – p, s

B – r

C – p, q

D – p

43. Solution: A – p, q, s

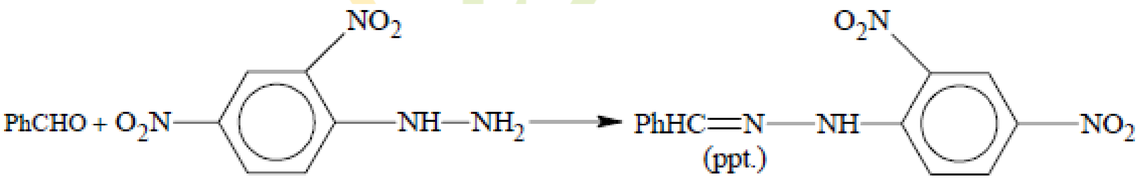
B – q

C – q, r, s

D – q, r

(Note: Assuming $AgNO_3$ is ammonical.)

(A)



$$PhCHO + Ag_2O \xrightarrow{NH_3} PhCOO^- + \underset{\text{(white ppt.)}}{Ag\downarrow}$$

$$PhCHO \xrightarrow{KCN} Ph-\underset{H}{\overset{CN}{C}}-O^-$$

(B) $$CH_3C \equiv CH \xrightarrow{\text{ammonical } AgNO_3} \underset{\text{(White ppt.)}}{CH_3 - C \equiv C^- Ag^+ \downarrow}$$

(C)

$$PhCHO \xrightarrow{KCN} Ph-\underset{H}{\overset{CN}{C}}-O^-$$

$$AgNO_3 + CN^- \longrightarrow AgCN\downarrow$$

(D) $$AgNO_3 + I^- \longrightarrow AgI\downarrow$$

44. Solution: A – p, s

B – p, q

C – q

D – q, r

Crystals class	Axial distances	Angles
Cubic	$a = b = c$	$\alpha = \beta = \gamma = 90°$
Tetragonal	$a = b \neq c$	$\alpha = \beta = \gamma = 90°$
Orthorhombic	$a \neq b \neq c$	$\alpha = \beta = \gamma = 90°$
Hexagonal	$a = b \neq c$	$\alpha = \beta = 90°$ $\gamma = 120°$
Trigonal and rhombohedral	$a = b = c$	$\alpha = \beta = \gamma \neq 90°$
Monoclinic	$a \neq b \neq c$	$\alpha = \beta = 90°$ $\gamma \neq 90°$
Triclinic	$a \neq b \neq c$	$\alpha \neq \beta \neq \gamma \neq 90°$