Reliable INSTITUTE
Unleashing Potential

JEE MAIN 2024

JANUARY ATTEMPT

PAPER-1 (B.Tech / B.E.)

QUESTIONS & SOLUTIONS

Reproduced from Memory Retention

27 JANUARY, 2024

03:00 PM to 06:00 PM

Duration : 3 Hours | Maximum Marks : 300

SUBJECT - CHEMISTRY

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CHEMISTRY

1. For I[st] order reaction, time required for 99.9% completion is :

(1) $2t_{1/2}$ (2) $4t_{1/2}$ (3) $5t_{1/2}$ (4) $10t_{1/2}$

Ans. (4)

Sol. $$\frac{t_{99.9\%}}{t_{1/2}}=\frac{\frac{1}{k}\ln\left(\frac{100}{100-99.9}\right)}{\frac{1}{k}\ln 2}=\frac{\ln(10^3)}{\ln 2}=\frac{3}{0.3}=10$$

$t_{99.9\%}=10t_{1/2}$

2. Number of non polar molecules among following are :

HF, H_2O, CO_2, NH_3, SO_2, H_2, CH_4, BF_3

Ans. (4)

Sol. CO_2, H_2, CH_4, BF_3

3. 3M NaOH solution is to be prepared using 84 g NaOH, then the volume of solution in litre is ____ $\times 10^{-1}$

Ans. (7)

Sol. $3=\frac{84/40}{V_{sol(L)}}$

$\therefore V_{solution}=0.7$ L

4. Select **incorrect** match :

(1) Haber process : Fe

(2) Polythene : Ziegler-Natta catalyst $[Al_2(CH_3)_6 + TiCl_4]$

(3) Wacker's process : $PtCl_2$

(4) Photography : AgBr

Ans. (3)

Sol. Wacker's process : $PdCl_2$

5. 1 mole PbS is oxidised by x mole O_3 liberating y mole O_2.

Determine (x + y).

Ans. **(8)**

Sol. $PbS + 4O_3 \longrightarrow PbSO_4 + 4O_2$

x = 4 ; y = 4

6. Spin only magnetic moment of $[Pt(NH_3)_2Cl(CH_3NH_2)]Cl$ is :

Ans. **(0)**

Sol. Pt^{+2} : $5d^8 \Rightarrow dsp^2$ & unpaired $e^- = 0 \Rightarrow$ Magnetic moment = 0

7. **S-1:** Formation of Ce^{4+} is favoured by inert gas configuration.

S-2: Ce^{4+} acts as strong oxidising agent & converts to Ce^{3+}.

Ans. Both S-1 & S-2 are correct.

8. Which of the following can't act as oxidising agent ?

(1) MnO_4^- (2) N^{3-} (3) BrO_3^- (4) SO_4^{2-}

Ans. **(2)**

Sol. In N^{-3}, nitrogen is present in minimum O.N. & hence it cannot act as oxidising agent.

9. The quantity which changes with temperature is:

(1) Molarity (2) Molality (3) Mole fraction (4) Mass %

Ans. **(1)**

Sol. Quantities involving volume are temperature dependent.

10. Reduction potential of hydrogen electrode at pH = 3 is.........

$$\left(\frac{2.303RT}{F} = 0.059\right)$$

Ans. **(–0.177 volt)**

Sol. $H^+ (aq) + e^- \longrightarrow \frac{1}{2} H_2(g)$

$$R.P. = -\frac{0.059}{1}\log\left(\frac{1}{H^+}\right) = -0.059\log(10^{+3})$$

$$= -0.059 \times 3 = -0.177 \text{ volt}$$

11. Identify the species in which central atom is in d^2sp^3 hybridisation :

(1) SF_6 (2) BrF_5 (3) $[PtCl_4]^{2-}$ (4) $[Co(NH_3)_6]^{3+}$

Ans. **(4)**

Sol.

SF_6	:	sp^3d^2
BrF_5	:	sp^3d^2
$[PtCl_4]^{2-}$	:	dsp^2
$[Co(NH_3)_6]^{3+}$	:	d^2sp^3

12. $\Delta H° = +77.2$ kJ, $\Delta S° = 122$ J/mol-K, T = 300 K, logK = ?

Ans. **(–7.07)**

Sol. $\Delta G° = -2.303RT\log k$

$$77.2 - \frac{300 \times 122}{1000} = \frac{-2.303 \times 8.314 \times 300 \log K}{1000}$$

$\therefore \log K = -7.07$

13. In group 16

Statement-I : Oxygen shows only –2 oxidation state.

Statement-II : On moving top to bottom, stability of +4 oxidation state decreases, whereas that of +6 oxidation state increases.

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Ans. **(2)**

Sol. **Statement-I :** Since electronegativity of oxygen is very high, it shows only negative oxidation state as –2 except in the case of OF_2 where its oxidation state is + 2.

Statement-II : The stability of + 6 oxidation state decreases down the group and stability of + 4 oxidation state increases (inert pair effect).

14. How many of following has/have noble gas configuration ?

Sr^{2+}, Cs^{+}, Yb^{+2}, La^{2+}

Ans. **(2)**

Sol. (Sr^{2+}, Cs^{+})

15. Which of the following has d^{10} configuration ?

(1) Cr, Cd, Cu, Ag (2) Cd, Cr, Ag, Zn

(3) Ag, Cr, Cu, Zn (4) Cu, Cd, Zn, Ag

Ans. **(4)**

Sol. Cr : [Ar] $3d^5$ $4s^1$

Cu : [Ar] $3d^{10}$ $4s^1$

Ag : [Kr] $4d^{10}$ $5s^1$

Zn : [Ar] $3d^{10}$ $4s^2$

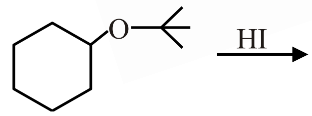
Cd : [Kr] $4d^{10}$ $5s^2$

16. Which of the following is used to identify the phenolic group test?

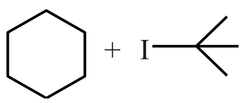
(1) Carbylamine test (2) Lucas test

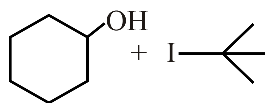
(3) Tollen's test (4) Phthalein dye test

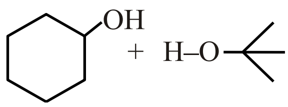
Ans. **(4)**

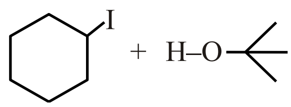
17. 

Product is :

(1) 

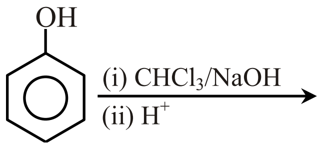
(2) 

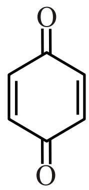
(3) 

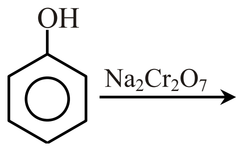
(4) 

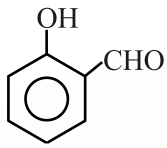
Ans. **(2)**

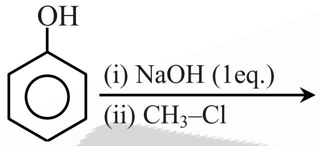
18. Match the column

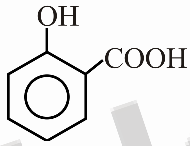
(P) 

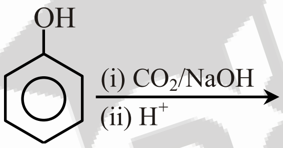
(1) 

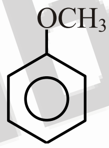
(Q) 

(2) 

(R) 

(3) 

(S) 

(4) 

Ans. **(P) – (2) ; (Q) – (1) ; (R) – (4) ; (S) – (3)**

19. When egg is boiled then which of the following structure of protein remains intact?

(1) Quaternary structure
(2) Primary structure
(3) Secondary structure
(4) Tertiary structure

Ans. **(2)**

20. Which of the following compound will not give S_N1 reaction?

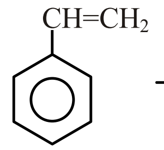
(1) $CH_2{=}CH{-}CH_2Cl$
(2) $Ph{-}CH_2{-}Cl$
(3) $(H_3C)_2CH{-}Cl$
(4) $CH_3{-}CH{=}CH{-}Cl$

Ans. **(4)**

21. The second homologue of monocarboxylic acid is

(1) HCOOH
(2) CH_3COOH
(3) CH_3CH_2COOH
(4) $CH_3CH_2CH_2{-}COOH$

Ans. **(2)**

22.  $\xrightarrow[\text{(2) HBr}]{\text{(1) } B_2H_6/H_2O_2, OH^{\ominus}}$ Product is

(3) Mg/dry ether

(4) $H-\underset{\underset{O}{||}}{C}-H$

(5) H_3O^+

(1) $Ph-\overset{\overset{CH_2-OH}{|}}{CH}-CH_3$

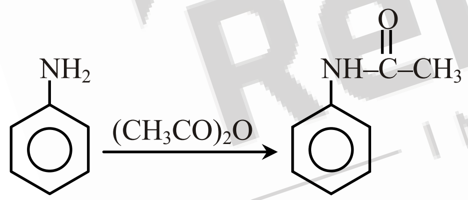
(2) $Ph-CH_2-CH_2-CH_2-OH$

(3) $Ph-CH_2-CH_2-O-CH_3$

(4) $Ph-\underset{\underset{OH}{|}}{CH}-CH_2-CH_3$

Ans. **(1)**

23. When 9.3 gm of aniline in reacted with acetic anhydride then mass of acetanilide formed is [X] gm. Report your answer as 10X.

Sol. 

9.3 gm

Mole of Aniline = $\frac{9.3}{93} = 0.1$

Mole of acetanilide = 0.1

Mass of acetanilide = 0.1 × 135 = 13.5 gm

10x = 13.5 × 10 = 135 gm

24. The correct stability order of following resonating structures is

(I) $CH_2=CH-CH=O$ (II) $\overset{\oplus}{C}H_2-CH=\overset{\overset{O^{\ominus}}{|}}{C}-H$ (III) $\overset{\ominus}{C}H_2-CH=\overset{\overset{O^{\oplus}}{|}}{C}-H$

(1) II > III > I (2) I > II > III (3) I > III > II (4) III > II > I

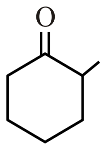
Ans. **(2)**

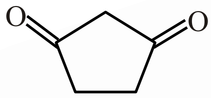
25. Steam volatile and water immiscible substances are separated by

(1) Steam distillation
(2) Fractional distillation under reduced pressure
(3) Fractional distillation
(4) Distillation.

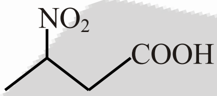
Ans. (1)

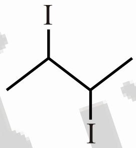
26. How many of the following compounds contain chiral centre ?

(I) 

(II) 

(III) $CH_3–CH_2–CH(OH)–COOH$

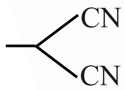
(IV) 

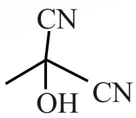
(V) 

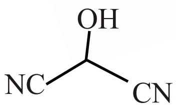
(VI) $CH_3–CH_2–CH(OH)–C_2H_5$

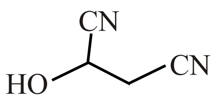
Ans. 4 (I, III, IV, V)

27. The bond line representation of following compound is
$CH(OH)(CN)_2$

(1) 

(2) 

(3) 

(4) 

Ans. (3)

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SATYAM CHAKRAVORTY

(Classroom) →

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