

## JEE Main 1 February 2024 Shift 1 Answer Key

### Chemistry

Q.1: Find out the total possible optical isomers of 2-chlorobutane.

A.1: 2

Q.2: The total number of deactivating groups among the following is:  
-CN, -NH-CO-CH<sub>3</sub>, -CO-CH<sub>3</sub>, -NH-CH<sub>3</sub>

A.2: 2

Q.3: In Kjeldahl's estimation of nitrogen, CuSO<sub>4</sub> acts as:

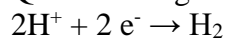
- i. Oxidising Agent
- ii. Reducing Agent
- iii. Catalyst
- iv. Reagent

A.3: Catalyst

Q.4: Which of the following is most likely attacked by an electrophile?

A.4: C<sub>6</sub>H<sub>6</sub>-OH

Q.5: We are given with following cell reaction:



$$P_{\text{H}_2} = 2 \text{ atm}$$

$$[\text{H}^+] = 1\text{M}$$

$$(2.303RT / F = 0.06)$$

If  $E_{\text{cell}}$  of the reaction is given by  $-x \times 10^{-3} \text{ V}$ . Find out x.

A.5: 9

Q.6: Statement I:  $S_8$  disproportionates into  $H_2S_2O_3$  and  $S_2^{2-}$  in an alkaline medium.

Statement II:  $ClO_4^-$  undergoes disproportionation in an acidic medium

- Both statements I and II are correct.
- Both statements I and II are incorrect.
- Statement I is correct and statement II is incorrect.
- Statement I is incorrect and statement II is correct.

A.6: Both statements I and II are correct

Q.7: Match the following:

Column 1: i.  $[Cr(H_2O)_6]^{3+}$ , ii.  $[Fe(H_2O)_6]^{3+}$ , iii.  $[Ni(H_2O)_6]^{2+}$ , iv.  $[V(H_2O)_6]^{3+}$

Column 2: a.  $t_{2g}^2 e_g^0$ , b.  $t_{2g}^3 e_g^0$ , c.  $t_{2g}^3 e_g^2$ , d.  $t_{2g}^6 e_g^2$

A.7: a-ii, b-iv, c-iii, d-i

Q.8: Statement I:  $PH_3$  will have a lower boiling point than  $NH_3$ .

Statement II: There are strong van der Waals forces in  $NH_3$  and strong hydrogen bonding in  $PH_3$ .

- Both statements I and II are correct.
- Both statements I and II are incorrect.
- Statement I is correct and statement II is incorrect.
- Statement I is incorrect and statement II is correct.

A.8: Statement I is correct and statement II is incorrect.

Q.9: What is the pH of  $CH_3COONH_4^{+}$ ? (At  $25^\circ C$ )

Given:  $K_a$  of  $CH_3COOH = 1.8 \times 10^{-5}$ ,  $K_b$  of  $NH_4OH = 1.8 \times 10^{-5}$

A.9: 7

Q.10: Which of the following is the correct for adiabatic free expansion against vacuum?

- $q = 0$ ,  $\Delta U = 0$ ,  $w = 0$
- $q \neq 0$ ,  $w = 0$ ,  $\Delta U = 0$
- $q = 0$ ,  $\Delta U \neq 0$ ,  $w = 0$
- $q = 0$ ,  $\Delta U \neq 0$ ,  $w \neq 0$

A.10:  $q = 0$ ,  $\Delta U = 0$ ,  $w = 0$

Q.11: Which of the following have a trigonal bipyramidal shape?  
 $\text{PF}_5$ ,  $\text{PBr}_5$ ,  $[\text{PtCl}_4]^-$ ,  $\text{SF}_6$ ,  $\text{BF}_3$ ,  $\text{BrF}_5$ ,  $\text{PCl}_5$ ,  $[\text{Fe}(\text{CO})_5]$

A.11:  $\text{PF}_5$ ,  $\text{PBr}_5$ ,  $\text{PCl}_5$ ,  $[\text{Fe}(\text{CO})_5]$  only

Q.12: Complementary stand of DNA ATGCTTCA is:

- i. TACGAAGA
- ii. TACGAAGT
- iii. TAGCAACA
- iv. TAGCTACT

A.12: TACGAAGT

Q.13: NaCl samples have their van't Hoff factor as follows:

Sample 1 of 0.1 M -  $i_1$

Sample 2 of 0.01 M -  $i_2$

Sample 3 of 0.001 M -  $i_3$

Find the relation between  $i_1$ ,  $i_2$ , and  $i_3$ .

A.13:  $i_1 = i_2 = i_3$

Q.14:  $\text{Cr}_2\text{O}_7^{2-} + x\text{H}^+ + y\text{e}^- \rightarrow 2\text{Cr}^{3+} + \text{AH}_2\text{O}$

Balance the above reaction and find x, y and A.

A.14:  $x = 14$ ,  $y = 6$ ,  $A = 7$

Q.15: How many oxides are amphoteric in nature?

$\text{SnO}_2$ ,  $\text{PbO}_2$ ,  $\text{SiO}_2$ ,  $\text{P}_2\text{O}_5$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{CO}_2$ ,  $\text{CO}$ ,  $\text{NO}$ ,  $\text{N}_2\text{O}$

A.15: 3