

FINAL JEE-MAIN EXAMINATION – MARCH, 2021

(Held On Wednesday 17th March, 2021) TIME : 9 : 00 AM to 12 : 00 NOON

CHEMISTRY

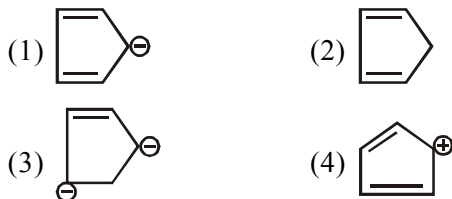
SECTION-A

1. With respect to drug-enzyme interaction, identify the wrong statement:

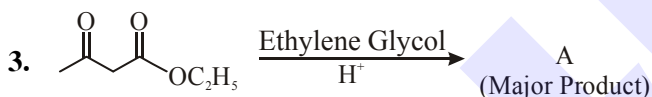
- (1) Non-Competitive inhibitor binds to the allosteric site
- (2) Allosteric inhibitor changes the enzyme's active site
- (3) Allosteric inhibitor competes with the enzyme's active site
- (4) Competitive inhibitor binds to the enzyme's active site

Official Ans. by NTA (3)

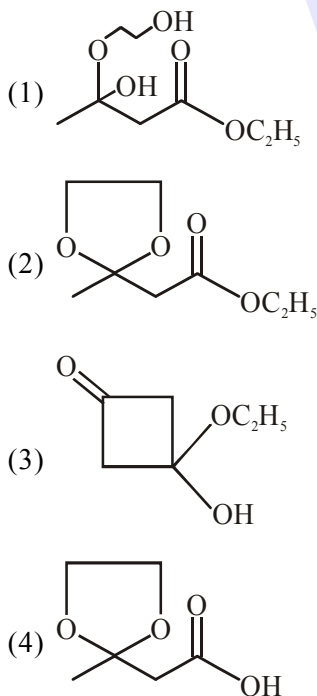
2. Which of the following is an aromatic compound?



Official Ans. by NTA (1)



The product "A" in the above reaction is:



Official Ans. by NTA (2)

TEST PAPER WITH ANSWER

4. A central atom in a molecule has two lone pairs of electrons and forms three single bonds. The shape of this molecule is:

- (1) see-saw
- (2) planar triangular
- (3) T-shaped
- (4) trigonal pyramidal

Official Ans. by NTA (3)

5. Given below are two statements:

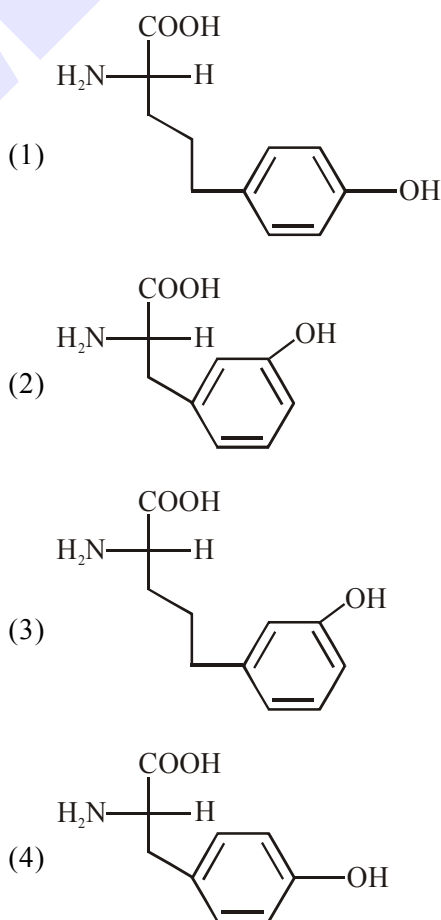
Statement I : Potassium permanganate on heating at 573 K forms potassium manganate.
Statement II : Both potassium permanganate and potassium manganate are tetrahedral and paramagnetic in nature.

In the light of the above statements, choose the most appropriate answer from the options given below:

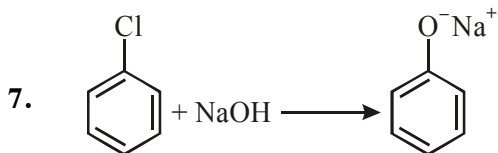
- (1) Statement I is true but statement II is false
- (2) Both statement I and statement II are true
- (3) Statement I is false but statement II is true
- (4) Both statement I and statement II are false

Official Ans. by NTA (1)

6. Which of the following is correct structure of tyrosine?



Official Ans. by NTA (4)



The above reaction requires which of the following reaction conditions?

- (1) 573 K, Cu, 300 atm
- (2) 623 K, Cu, 300 atm
- (3) 573 K, 300 atm
- (4) 623 K, 300 atm

Official Ans. by NTA (4)

8. The absolute value of the electron gain enthalpy of halogens satisfies:

- (1) $I > Br > Cl > F$
- (2) $Cl > Br > F > I$
- (3) $Cl > F > Br > I$
- (4) $F > Cl > Br > I$

Official Ans. by NTA (3)

9. Which of the following compound CANNOT act as a Lewis base?

- (1) NF_3
- (2) PCl_5
- (3) SF_4
- (4) ClF_3

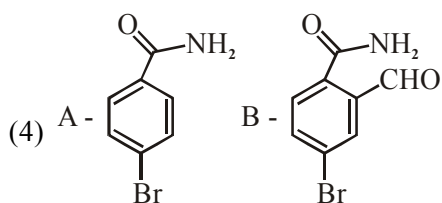
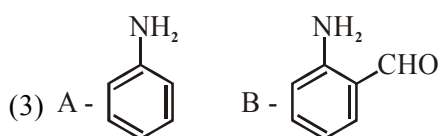
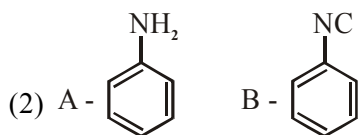
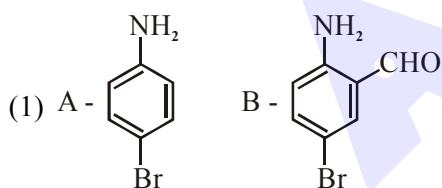
Official Ans. by NTA (2)

10. Reducing smog is a mixture of:

- (1) Smoke, fog and O_3
- (2) Smoke, fog and SO_2
- (3) Smoke, fog and $CH_2=CH-CHO$
- (4) Smoke, fog and N_2O_3

Official Ans. by NTA (2)

11. Hoffmann bromamide degradation of benzamide gives product A, which upon heating with $CHCl_3$ and $NaOH$ gives product B. The structures of A and B are :



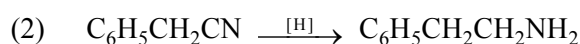
Official Ans. by NTA (2)

12. Mesityl oxide is a common name of :

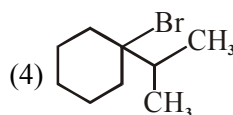
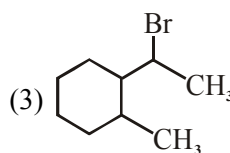
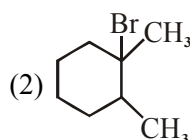
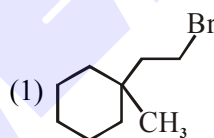
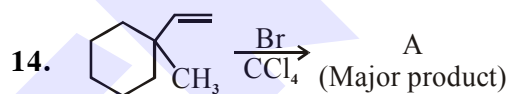
- (1) 2,4-Dimethyl pentan-3-one
- (2) 3-Methyl cyclohexane carbaldehyde
- (3) 2-Methyl cyclohexanone
- (4) 4-Methyl pent-3-en-2-one

Official Ans. by NTA (4)

13. Which of the following reaction is an example of ammonolysis?



Official Ans. by NTA (4)



Official Ans. by NTA (4)

15. A colloidal system consisting of a gas dispersed in a solid is called a/an :

- (1) solid sol
- (2) gel
- (3) aerosol
- (4) foam

Official Ans. by NTA (1)

16. The INCORRECT statement(s) about heavy water is (are)

- (A) used as a moderator in nuclear reactor
(B) obtained as a by-product in fertilizer industry.
(C) used for the study of reaction mechanism
(D) has a higher dielectric constant than water

Choose the correct answer from the options given below :

- (1) (B) only (2) (C) only
(3) (D) only (4) (B) and (D) only

Official Ans. by NTA (3)

17. The correct order of conductivity of ions in water is :

- (1) $\text{Na}^+ > \text{K}^+ > \text{Rb}^+ > \text{Cs}^+$
(2) $\text{Cs}^+ > \text{Rb}^+ > \text{K}^+ > \text{Na}^+$
(3) $\text{K}^+ > \text{Na}^+ > \text{Cs}^+ > \text{Rb}^+$
(4) $\text{Rb}^+ > \text{Na}^+ > \text{K}^+ > \text{Li}^+$

Official Ans. by NTA (2)

18. What is the spin-only magnetic moment value (BM) of a divalent metal ion with atomic number 25, in its aqueous solution?

- (1) 5.92
(2) 5.0
(3) zero
(4) 5.26

Official Ans. by NTA (1)

19. Given below are two statements :

Statement-I : Retardation factor (R_f) can be measured in meter/centimeter.

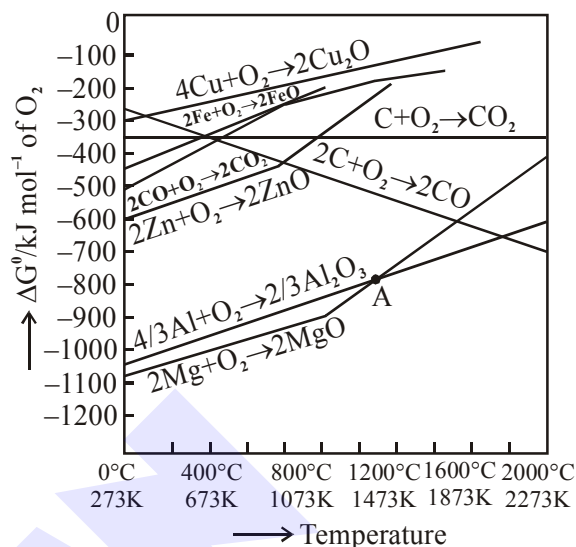
Statement-II : R_f value of a compound remains constant in all solvents.

Choose the most appropriate answer from the options given below:

- (1) Statement-I is true but statement-II is false
(2) Both statement-I and statement-II are true
(3) Both statement-I and statement-II are false
(4) Statement-I is false but statement-II is true

Official Ans. by NTA (3)

20. The point of intersection and sudden increase in the slope, in the diagram given below, respectively, indicates :



- (1) $\Delta G = 0$ and melting or boiling point of the metal oxide
(2) $\Delta G > 0$ and decomposition of the metal oxide
(3) $\Delta G < 0$ and decomposition of the metal oxide
(4) $\Delta G = 0$ and reduction of the metal oxide

Official Ans. by NTA (1)

Official Ans. by ALLEN (Bonus)

SECTION-B

1. The reaction of white phosphorus on boiling with alkali in inert atmosphere resulted in the formation of product 'A'. The reaction 1 mol of 'A' with excess of AgNO_3 in aqueous medium gives _____ mol(s) of Ag. (Round off to the Nearest Integer).

Official Ans. by NTA (4)

2. 0.01 moles of a weak acid HA ($K_a = 2.0 \times 10^{-6}$) is dissolved in 1.0 L of 0.1 M HCl solution. The degree of dissociation of HA is _____ $\times 10^{-5}$ (Round off to the Nearest Integer).

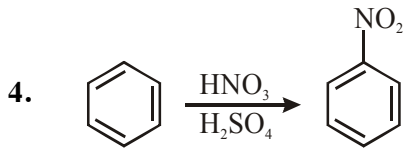
[Neglect volume change on adding HA.

Assume degree of dissociation $\ll 1$]

Official Ans. by NTA (2)

3. A certain orbital has $n = 4$ and $m_l = -3$. The number of radial nodes in this orbital is _____. (Round off to the Nearest Integer).

Official Ans. by NTA (0)



In the above reaction, 3.9 g of benzene on nitration gives 4.92 g of nitrobenzene. The percentage yield of nitrobenzene in the above reaction is _____ %.

(Round off to the Nearest Integer).
 (Given atomic mass : C : 12.0 u, H : 1.0u, O : 16.0 u, N : 14.0 u)

Official Ans. by NTA (80)

5. The mole fraction of a solute in a 100 molal aqueous solution _____ $\times 10^{-2}$. (Round off to the Nearest Integer).

[Given : Atomic masses : H : 1.0 u, O : 16.0 u]

Official Ans. by NTA (64)

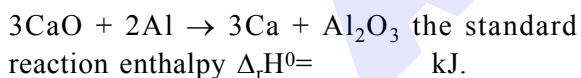
6. For a certain first order reaction 32% of the reactant is left after 570 s. The rate constant of this reaction is _____ $\times 10^{-3} \text{ s}^{-1}$. (Round off to the Nearest Integer).

[Given : $\log_{10} 2 = 0.301$, $\ln 10 = 2.303$]

Official Ans. by NTA (2)

7. The standard enthalpies of formation of Al_2O_3 and CaO are $-1675 \text{ kJ mol}^{-1}$ and -635 kJ mol^{-1} respectively.

For the reaction



(Round off to the Nearest Integer).

Official Ans. by NTA (230)

8. 15 mL of aqueous solution of Fe^{2+} in acidic medium completely reacted with 20 mL of 0.03 M aqueous $\text{Cr}_2\text{O}_7^{2-}$. The molarity of the Fe^{2+} solution is _____ $\times 10^{-2} \text{ M}$ (Round off to the Nearest Integer).

Official Ans. by NTA (24)

9. The oxygen dissolved in water exerts a partial pressure of 20 kPa in the vapour above water. The molar solubility of oxygen in water is _____ $\times 10^{-5} \text{ mol dm}^{-3}$. (Round off to the Nearest Integer).

[Given : Henry's law constant

$$= K_H = 8.0 \times 10^4 \text{ kPa for O}_2.$$

Density of water with dissolved oxygen = 1.0 kg dm^{-3}]

Official Ans. by NTA (25)

Official Ans. by ALLEN (1389)

10. The pressure exerted by a non-reactive gaseous mixture of 6.4 g of methane and 8.8 g of carbon dioxide in a 10 L vessel at 27°C is _____ kPa. (Round off to the Nearest Integer).

[Assume gases are ideal, $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$

Atomic masses : C : 12.0 u, H : 1.0 u, O : 16.0 u]

Official Ans. by NTA (150)