

FINAL JEE-MAIN EXAMINATION – MARCH, 2021

(Held On Thursday 18th March, 2021) TIME : 3 : 00 PM to 6 : 00 PM

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

1. The oxidation states of nitrogen in NO, NO₂, N₂O and NO₃⁻ are in the order of :

- (1) NO₃⁻ > NO₂ > NO > N₂O
(2) NO₂ > NO₃⁻ > NO > N₂O
(3) N₂O > NO₂ > NO > NO₃⁻
(4) NO > NO₂ > N₂O > NO₃⁻

Official Ans. by NTA (1)

2. In basic medium, H₂O₂ exhibits which of the following reactions ?

- (A) Mn²⁺ → Mn⁴⁺
(B) I₂ → I⁻
(C) PbS → PbSO₄

Choose the most appropriate answer from the options given below :

- (1) (A), (C) only
(2) (A) only
(3) (B) only
(4) (A), (B) only

Official Ans. by NTA (4)

3. In the reaction of hypobromite with amide, the carbonyl carbon is lost as :

- (1) CO₃²⁻
(2) HCO₃⁻
(3) CO₂
(4) CO

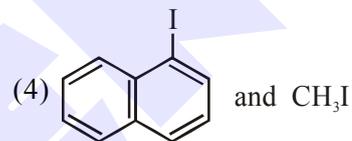
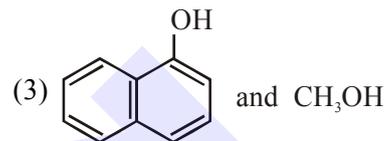
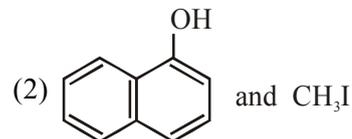
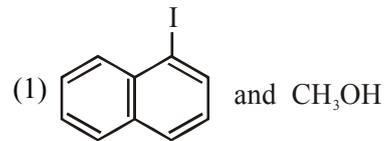
Official Ans. by NTA (1)

4. The oxide that shows magnetic property is :

- (1) SiO₂
(2) Mn₃O₄
(3) Na₂O
(4) MgO

Official Ans. by NTA (2)

5. Main Products formed during a reaction of 1-methoxy naphthalene with hydroiodic acid are:



Official Ans. by NTA (2)

6. Deficiency of vitamin K causes :

- (1) Increase in blood clotting time
(2) Increase in fragility of RBC's
(3) Cheilosis
(4) Decrease in blood clotting time

Official Ans. by NTA (1)

7. An organic compound "A" on treatment with benzene sulphonyl chloride gives compound B. B is soluble in dil. NaOH solution. Compound A is :

- (1) C₆H₅-N-(CH₃)₂ (2) C₆H₅-NHCH₂CH₃
(3) C₆H₅-CH₂NHCH₃ (4) C₆H₅-CH(NH₂)CH₃

Official Ans. by NTA (4)

8. The first ionization energy of magnesium is smaller as compared to that of elements X and Y, but higher than that of Z. the elements X, Y and Z, respectively, are :

- (1) chlorine, lithium and sodium
(2) argon, lithium and sodium
(3) argon, chlorine and sodium
(4) neon, sodium and chlorine

Official Ans. by NTA (3)

9. The secondary valency and the number of hydrogen bonded water molecule(s) in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, respectively, are :

- (1) 6 and 4 (2) 4 and 1
(3) 6 and 5 (4) 5 and 1

Official Ans. by NTA (2)

10. Given below are two statements :

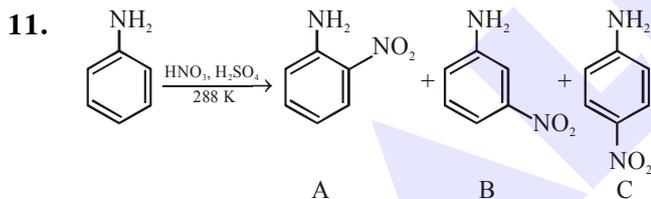
Statement I : Bohr's theory accounts for the stability and line spectrum of Li^+ ion.

Statement II : Bohr's theory was unable to explain the splitting of spectral lines in the presence of a magnetic field.

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

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

Official Ans. by NTA (2)



Consider the given reaction, percentage yield of :

- (1) $C > A > B$ (2) $B > C > A$
(3) $A > C > B$ (4) $C > B > A$

Official Ans. by NTA (4)

12. The charges on the colloidal CdS sol and TiO_2 sol are, respectively :

- (1) positive and positive
(2) positive and negative
(3) negative and negative
(4) negative and positive

Official Ans. by NTA (4)

13. Match List - I with List - II :

List - I

List - II

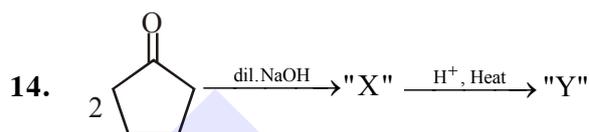
(Class of Chemicals)

(Example)

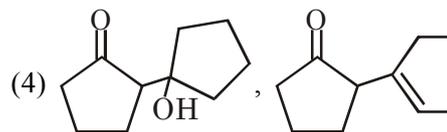
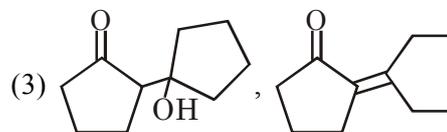
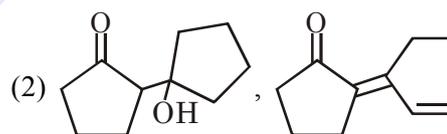
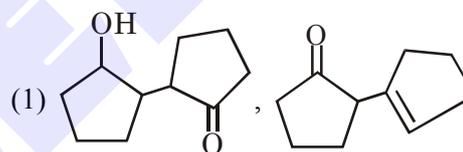
- (a) Antifertility drug (i) Meprobamate
(b) Antibiotic (ii) Alitame
(c) Tranquilizer (iii) Norethindrone
(d) Artificial Sweetener (iv) Salvarsan

- (1) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(2) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
(3) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
(4) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

Official Ans. by NTA (3)



Consider the above reaction, the product 'X' and 'Y' respectively are :



Official Ans. by NTA (3)

15. Match list-I with list-II :

List-I

List-II

- (a) Be (i) Treatment of cancer
(b) Mg (ii) Extraction of metals
(c) Ca (iii) Incendiary bombs and signals

- (d) Ra (iv) Windows of X-ray tubes
(v) Bearings for motor engines.

Choose the most appropriate answer the option given below :

- (1) a-iv, b-iii, c-i, d-ii
(2) a-iv, b-iii, c-ii, d-i
(3) a-iii, b-iv, c-v, d-ii
(4) a-iii, b-iv, c-ii, d-v

Official Ans. by NTA (2)

16. Given below are two statements :

Statement I : C_2H_5OH and $AgCN$ both can generate nucleophile.

Statement II : KCN and $AgCN$ both will generate nitrile nucleophile with all reaction conditions.

Choose the most appropriate option :

- (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)

17. Given below are two statements :

Statement I : Non-biodegradable wastes are generated by the thermal power plants.

Statement II : Bio-degradable detergents leads to eutrophication.

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

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

Official Ans. by NTA (4)

18. Match list-I with list-II :

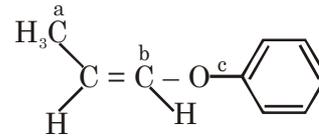
- | List-I | List-II |
|-------------|-----------------------------|
| (a) Mercury | (i) Vapour phase refining |
| (b) Copper | (ii) Distillation refining |
| (c) Silicon | (iii) Electrolytic refining |
| (d) Nickel | (iv) Zone refining |

Choose the most appropriate answer from the option given below :

- (1) a-i, b-iv, c-ii, d-iii (2) a-ii, b-iii, c-i, d-iv
(3) a-ii, b-iii, c-iv, d-i (4) a-ii, b-iv, c-iii, d-i

Official Ans. by NTA (3)

19. In the following molecules,



Hybridisation of carbon a, b and c respectively are :

- (1) sp^3 , sp , sp (2) sp^3 , sp^2 , sp
(3) sp^3 , sp^2 , sp^2 (4) sp^3 , sp , sp^2

Official Ans. by NTA (3)

20. A hard substance melts at high temperature and is an insulator in both solid and in molten state.

This solid is most likely to be a / an :

- (1) Ionic solid (2) Molecular solid
(3) Metallic solid (4) Covalent solid

Official Ans. by NTA (4)

SECTION-B

1. A reaction has a half life of 1 min. The time required for 99.9% completion of the reaction is _____ min. (Round off to the Nearest integer)

[Use : $\ln 2 = 0.69$, $\ln 10 = 2.3$]

Official Ans. by NTA (10)

2. The molar conductivities at infinite dilution of barium chloride, sulphuric acid and hydrochloric acid are 280, 860 and 426 $Scm^2 mol^{-1}$ respectively. The molar conductivity at infinite dilution of barium sulphate is _____ $S cm^2 mol^{-1}$ (Round off to the Nearest Integer).

Official Ans. by NTA (288)

3. The number of species below that have two lone pairs of electrons in their central atom is _____ (Round off to the Nearest integer)

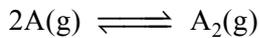
SF_4 , BF_4^- , ClF_3 , AsF_3 , PCl_5 , BrF_5 , XeF_4 , SF_6

Official Ans. by NTA (2)

4. A xenon compound 'A' upon partial hydrolysis gives XeO_2F_2 . The number of lone pair of electrons present in compound A is _____ (Round off to the Nearest integer)

Official Ans. by NTA (19)

5. The gas phase reaction



at 400 K has $\Delta G^\circ = + 25.2 \text{ kJ mol}^{-1}$.

The equilibrium constant K_C for this reaction is _____ $\times 10^{-2}$. (Round off to the Nearest integer)

[Use : $R = 8.3 \text{ J mol}^{-1}\text{K}^{-1}$, $\ln 10 = 2.3$

$\log_{10} 2 = 0.30$, $1 \text{ atm} = 1 \text{ bar}$]

[antilog $(-0.3) = 0.501$]

Official Ans. by NTA (166)

Official Ans. by ALLEN (2)

6. In Tollen's test for aldehyde, the overall number of electron(s) transferred to the Tollen's reagent formula $[\text{Ag}(\text{NH}_3)_2]^+$ per aldehyde group to form silver mirror is _____. (Round off to the Nearest integer)

Official Ans. by NTA (2)

7. The solubility of CdSO_4 in water is $8.0 \times 10^{-4} \text{ mol L}^{-1}$. Its solubility in 0.01 M H_2SO_4 solution is _____ $\times 10^{-6} \text{ mol L}^{-1}$. (Round off to the Nearest integer) (Assume that solubility is much less than 0.01 M)

Official Ans. by NTA (64)

8. A solute dimerizes in water. The boiling point of a 2 molar solution of A is 100.52°C . The percentage association of A is ____.

(Round off to the Nearest integer)

[Use : K_b for water = $0.52 \text{ K kg mol}^{-1}$

Boiling point of water = 100°C]

Official Ans. by NTA (50)

Official Ans. by ALLEN (100)

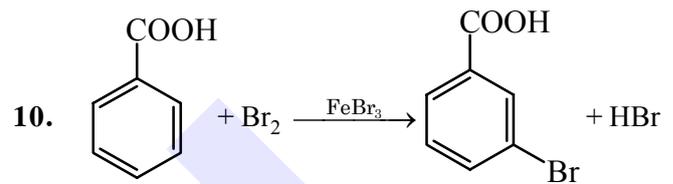
9. 10.0 ml of Na_2CO_3 solution is titrated against 0.2 M HCl solution. The following titre values were obtained in 5 readings.

4.8 ml, 4.9 ml, 5.0 ml, 5.0 ml and 5.0 ml

Based on these readings, and convention of titrimetric estimation of concentration of Na_2CO_3 solution is _____ mM.

(Round off to the Nearest integer)

Official Ans. by NTA (50)



Consider the above reaction where 6.1 g of benzoic acid is used to get 7.8 g of m-bromo benzoic acid. The percentage yield of the product is _____.

(Round off to the Nearest integer)

[Given : Atomic masses : C = 12.0u, H : 1.0u, O : 16.0u, Br = 80.0 u]

Official Ans. by NTA (78)