FINAL JEE–MAIN EXAMINATION – JUNE, 2022

(Held On Tuesday 28th June, 2022) **TIME : 3 : 00 PM to 6 : 00 PM**

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

1. Compound A contains 8.7% Hydrogen, 74% Carbon and 17.3% Nitrogen. The molecular formula of the compound is,

Given : Atomic masses of C, H and N are 12, 1 and 14 amu respectively.

The molar mass of the compound A is 162 g mol^{-1}.

(A) $C_4H_6N_2$ (B) C_2H_3N

(C) C_5H_7N (D) $C_{10}H_{14}N_2$

Official Ans. by NTA (D)

Allen Ans. (D)

2. Consider the following statements :

(A) The principal quantum number 'n' is a positive integer with values of 'n' = 1, 2, 3, ….

(B) The azimuthal quantum number '*l*' for a given 'n' (principal quantum number) can have values as '*l*' = 0, 1, 2, …. n

(C) Magnetic orbital quantum number 'm_l' for a particular '*l*' (azimuthal quantum number) has (2*l* + 1) values.

(D) ±1/2 are the two possible orientations of electron spin.

(E) For *l* = 5, there will be a total of 9 orbital.

Which of the above statements are **correct**?

(A) (A), (B) and (C)

(B) (A), (C), (D) and (E)

(C) (A), (C) and (D)

(D) (A), (B), (C) and (D)

Official Ans. by NTA (C)

Allen Ans. (C)

3. In the structure of SF_4, the lone pair of electrons on S is in.

(A) equatorial position and there are two lone pair-bond pair repulsions at 90°

(B) equatorial position and there are three lone pair-bond pair repulsions at 90°

(C) axial position and there are three lone pair – bond pair repulsion at 90°.

(D) axial position and there are two lone pair – bond pair repulsion at 90°.

Official Ans. by NTA (A)

Allen Ans. (A)

4. A student needs to prepare a buffer solution of propanoic acid and its sodium salt with pH 4. The ratio of $\frac{[CH_3CH_2COO^-]}{[CH_3CH_2COOH]}$ required to make buffer is …….

Given : $K_a(CH_3CH_2COOH) = 1.3 \times 10^{-5}$

(A) 0.03 (B) 0.13

(C) 0.23 (D) 0.33

Official Ans. by NTA (B)

Allen Ans. (B)

5. Match List-I with List-II.

List-I		List-II	
(A)	Negatively charged sol	(I)	$Fe_2O_3 \cdot xH_2O$
(B)	Macromolecular colloid	(II)	CdS sol
(C)	Positively charged sol	(III)	Starch
(D)	Cheese	(IV)	a gel

Choose the correct answer from the options given below :

(A) (A) – (II), (B) – (III), (C) – (IV), (D) – (I)

(B) (A) – (II), (B) – (I), (C) – (III), (D) – (IV)

(C) (A) – (II), (B) – (III), (C) – (I), (D) – (IV)

(D) (A) – (I), (B) – (III), (C) – (II), (D) – (IV)

Official Ans. by NTA (C)

Allen Ans. (C)

6. Match List-I with List-II.

List-I (Oxide)		List-II (Nature)	
(A)	Cl_2O_7	(I)	Amphoteric
(B)	Na_2O	(II)	Basic
(C)	Al_2O_3	(III)	Neutral
(D)	N_2O	(IV)	Acidic

Choose the **correct** answer from the options given below :

(A) (A) – (IV), (B) – (III), (C) – (I), (D) – (II)

(B) (A) – (IV), (B) – (II), (C) – (I), (D) – (III)

(C) (A) – (II), (B) – (IV), (C) – (III), (D) – (I)

(D) (A) – (I), (B) – (II), (C) – (IIII), (D) – (IV)

Official Ans. by NTA (B)

Allen Ans. (B)

7. In the metallurgical extraction of copper, following reaction is used :

$FeO + SiO_2 \rightarrow FeSiO_3$

FeO and $FeSiO_3$ respectively are.

(A) gangue and flux (B) flux and slag

(C) slag and flux (D) gangue and slag

Official Ans. by NTA (D)

Allen Ans. (D)

8. Hydrogen has three isotopes : protium (^1H), deuterium (^2H or D) and tritium (^3H or T). They have nearly same chemical properties but different physical properties. They differ in

(A) number of protons

(B) atomic number

(C) electronic configuration

(D) atomic mass

Official Ans. by NTA (D)

Allen Ans. (D)

9. Among the following basic oxide is :

(A) SO_3 (B) SiO_2

(C) CaO (D) Al_2O_3

Official Ans. by NTA (C)

Allen Ans. (C)

10. Among the given oxides of nitrogen; N_2O, N_2O_3, N_2O_4 and N_2O_5, the number of compound/(s) having N–N bond is :

(A) 1 (B) 2

(C) 3 (D) 4

Official Ans. by NTA (C)

Allen Ans. (C)

11. Which of the following oxoacids of sulphur contains "S" in two different oxidation states?

(A) $H_2S_2O_3$ (B) $H_2S_2O_6$

(C) $H_2S_2O_7$ (D) $H_2S_2O_8$

Official Ans. by NTA (A)

Allen Ans. (A)

12. Correct statement about photo-chemical smog is :

(A) It occurs in humid climate.

(B) It is a mixture of smoke, fog and SO_2

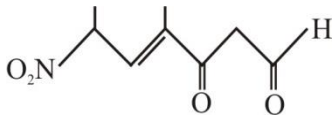
(C) It is reducing smog.

(D) It results from reaction of unsaturated hydrocarbons.

Official Ans. by NTA (D)

Allen Ans. (D)

13. The correct IUPAC name of the following compound is :



(A) 4-methyl-2-nitro-5-oxohept-3-enal

(B) 4-methyl-5-oxo-2-nitrohept-3-enal

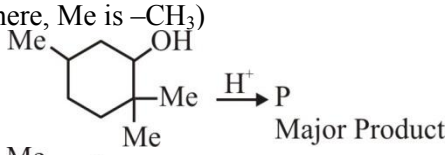
(C) 4-methyl-6-nitro-3-oxohept-4-enal

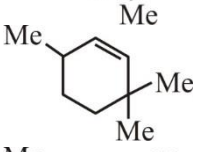
(D) 6-formyl-4-methyl-2-nitrohex-3-enal

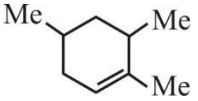
Official Ans. by NTA (C)

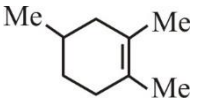
Allen Ans. (C)

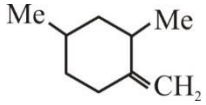
14. The major product (P) of the given reaction is (where, Me is $-CH_3$)



(A) 

(B) 

(C) 

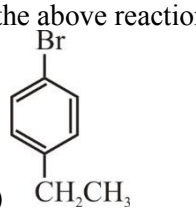
(D) 

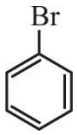
Official Ans. by NTA (C)

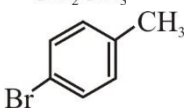
Allen Ans. (C)

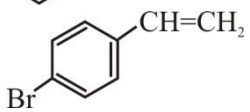
15. $A \xrightarrow[(ii)\ CN^-]{(i)\ Cl_2,\Delta} \xrightarrow[(iii)\ H_2O/H^+]{}$ 4-Bromophenyl acetic acid.

In the above reaction 'A' is

(A) 

(B) 

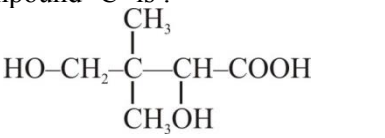
(C) 

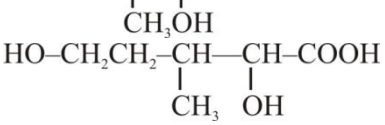
(D) 

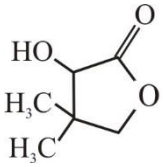
Official Ans. by NTA (C)

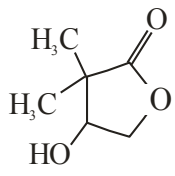
Allen Ans. (C)

16. Isobutyraldehyde on reaction with formaldehyde and K_2CO_3 gives compound 'A'. Compound 'A' reacts with KCN and yields compound 'B', which on hydrolysis gives a stable compound 'C'. The compound 'C' is :

(A) 

(B) 

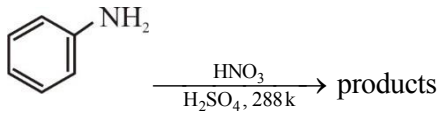
(C) 

(D) 

Official Ans. by NTA (C)

Allen Ans. (C)

17. With respect to the following reaction, consider the given statements :



(A) o-Nitroaniline and p-nitroaniline are the predominant products

(B) p-Nitroaniline and m-nitroaniline are the predominant products

(C) HNO_3 acts as an acid

(D) H_2SO_4 acts as an acid

(A) (A) and (C) are correct statements.

(B) (A) and (D) are correct statements.

(C) (B) and (D) are correct statements.

(D) (B) and (C) are correct statements.

Official Ans. by NTA (C)

Allen Ans. (C)

18. Given below are two statements, one is Assertion (A) and other is Reason (R).

Assertion (A) : Natural rubber is a linear polymer of isoprene called cis-polyisoprene with elastic properties.

Reason (R) : The cis-polyisoprene molecules consist of various chains held together by strong polar interactions with coiled structure.

In the light of the above statements, choose the **correct** one from the options given below :

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(C) (A) is true but (R) is false.

(D) (A) is false but (R) is true.

Official Ans. by NTA (C)

Allen Ans. (C)

19. When sugar 'X' is boiled with dilute H_2SO_4 in alcoholic solution, two isomers 'A' and 'B' are formed. 'A' on oxidation with HNO_3 yields saccharic acid where as 'B' is laevorotatory. The compound 'X' is :

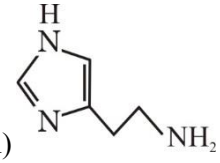
(A) Maltose (B) Sucrose

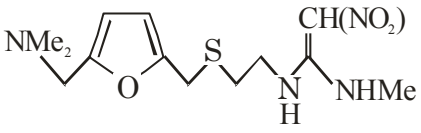
(C) Lactose (D) Starch

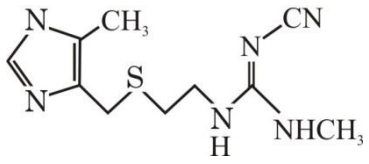
Official Ans. by NTA (B)

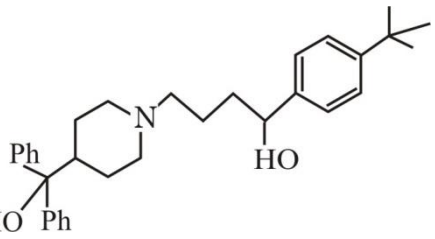
Allen Ans. (B)

20. The drug tegamet is :

(A) 

(B) 

(C) 

(D) 

Official Ans. by NTA (C)

Allen Ans. (C)

SECTION-B

1. 100 g of an ideal gas is kept in a cylinder of 416 L volume at 27°C under 1.5 bar pressure. The molar mass of the gas is _____ g mol^{-1}. (Nearest integer) (Given : R = 0.083 L bar K^{-1} mol^{-1})

Official Ans. by NTA (4)

Allen Ans. (4)

2. For combustion of one mole of magnesium in an open container at 300 K and 1 bar pressure, $\Delta_C H^{\ominus}$ = –601.70 kJ mol^{-1}, the magnitude of change in internal energy for the reaction is _____ kJ. (Nearest integer)

(Given : R = 8.3 J K^{-1} mol^{-1})

Official Ans. by NTA (600)

Allen Ans. (600)

3. 2.5 g of protein containing only glycine ($C_2H_5NO_2$) is dissolved in water to make 500 mL of solution. The osmotic pressure of this solution at 300 K is found to be 5.03×10^{-3} bar. The total number of glycine units present in the protein is ____

(Given : R = 0.083 L bar K^{-1} mol^{-1})

Official Ans. by NTA (330)

Allen Ans. (330)

4. For the given reactions

$Sn^{2+} + 2e^- \rightarrow Sn$

$Sn^{4+} + 4e^- \rightarrow Sn$

The electrode potentials are; $E^{o}_{Sn^{2+}/Sn}$ = –0.140 V and $E^{o}_{Sn^{4+}/Sn}$ = 0.010 V. The magnitude of standard electrode potential for Sn^{4+}/Sn^{2+} i.e. $E^{o}_{Sn^{4+}/Sn^{2+}}$ is _____ $\times 10^{-2}$ V. (Nearest integer)

Official Ans. by NTA (16)

Allen Ans. (16)

5. A radioactive element has a half life of 200 days. The percentage of original activity remaining after 83 days is _____. (Nearest integer)

(Given : antilog 0.125 = 1.333, antilog 0.693 = 4.93)

Official Ans. by NTA (75)

Allen Ans. (75)

6. $[Fe(CN)_6]^{4-}$

$[Fe(CN)_6]^{3-}$

$[Ti(CN)_6]^{3-}$

$[Ni(CN)_4]^{2-}$

$[Co(CN)_6]^{3-}$

Among the given complexes, number of paramagnetic complexes is _____.

Official Ans. by NTA (2)

Allen Ans. (2)

7. (a) $CoCl_3 \cdot 4\ NH_3$

(b) $CoCl_3 \cdot 5NH_3$

(c) $CoCl_3 \cdot .6NH_3$ and

(d) $CoCl(NO_3)_2 \cdot 5NH_3$

Number of complex(es) which will exist in cis-trans is/are

Official Ans. by NTA (1)

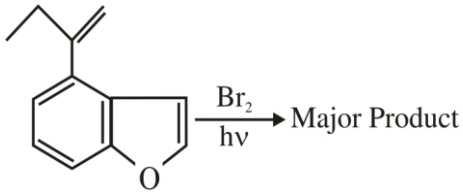
Allen Ans. (1)

8. The complete combustion of 0.492 g of an organic compound containing 'C', 'H' and 'O' gives 0.793g of CO_2 and 0.442 g of H_2O. The percentage of oxygen composition in the organic compound is _____. (nearest integer)

Official Ans. by NTA (46)

Allen Ans. (46)

9. The major product of the following reaction contains _____ bromine atom(s).



Official Ans. by NTA (1)

Allen Ans. (1)

10. 0.01 M $KMnO_4$ solution was added to 20.0 mL of 0.05 M Mohr's salt solution through a burette. The initial reading of 50 mL burette is zero. The volume of $KMnO_4$ solution left in the burette after the end point is _____ mL. (nearest integer)

Official Ans. by NTA (30)

Allen Ans. (30)