

FINAL JEE-MAIN EXAMINATION – JULY, 2022
(Held On Friday 29th July, 2022)
TIME : 9 : 00 AM to 12 : 00 NOON
CHEMISTRY
TEST PAPER WITH ANSWER
SECTION-A

1. Which of the following pair of molecules contain odd electron molecule and an expanded octet molecule?

(A) BCl_3 and SF_6 (B) NO and H_2SO_4
 (C) SF_6 and H_2SO_4 (D) BCl_3 and NO

Official Ans. by NTA (B)
Allen Ans. (B)

2. $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}$

20 g 5 g

Consider the above reaction, the limiting reagent of the reaction and number of moles of NH_3 formed respectively are:

(A) H_2 , 1.42 moles (B) H_2 , 0.71 moles
 (C) N_2 , 1.42 moles (D) N_2 , 0.71 moles

Official Ans. by NTA (C)
Allen Ans. (C)

3. 100 mL of 5% (w/v) solution of NaCl in water was prepared in 250 mL beaker. Albumin from the egg was poured into NaCl solution and stirred well. This resulted in a/an :

(A) Lyophilic sol (B) Lyophobic sol
 (C) Emulsion (D) Precipitate

Official Ans. by NTA (A)
Allen Ans. (A)

4. The first ionization enthalpy of Na, Mg and Si, respectively, are: 496, 737 and 786 kJ mol^{-1} . The first ionization enthalpy (kJ mol^{-1}) of Al is:

(A) 487 (B) 768
 (C) 577 (D) 856

Official Ans. by NTA (C)
Allen Ans. (C)

5. In metallurgy the term "gangue" is used for:

(A) Contamination of undesired earthy materials.
 (B) Contamination of metals, other than desired metal
 (C) Minerals which are naturally occurring in pure form
 (D) Magnetic impurities in an ore.

Official Ans. by NTA (A)
Allen Ans. (A)

6. The reaction of zinc with excess of aqueous alkali, evolves hydrogen gas and gives :

(A) $\text{Zn}(\text{OH})_2$ (B) ZnO
 (C) $[\text{Zn}(\text{OH})_4]^{2-}$ (D) $[\text{ZnO}_2]^{2-}$

Official Ans. by NTA (D)
Allen Ans. (C or D)

7. Lithium nitrate and sodium nitrate, when heated separately, respectively, give :

(A) LiNO_2 and NaNO_2 (B) Li_2O and Na_2O
 (C) Li_2O and NaNO_2 (D) LiNO_2 and Na_2O

Official Ans. by NTA (C)
Allen Ans. (C)

8. Number of lone pairs of electrons in the central atom of SCl_2 , O_3 , ClF_3 and SF_6 , respectively, are :

(A) 0, 1, 2 and 2 (B) 2, 1, 2 and 0
 (C) 1, 2, 2 and 0 (D) 2, 1, 2 and 0

Official Ans. by NTA (B)
Allen Ans. (B)

9. In following pairs, the one in which both transition metal ions are colourless is :

(A) Sc^{3+} , Zn^{2+} (B) Ti^{4+} , Cu^{2+}
 (C) V^{2+} , Ti^{3+} (D) Zn^{2+} , Mn^{2+}

Official Ans. by NTA (A)
Allen Ans. (A)

10. In neutral or faintly alkaline medium, KMnO_4 being a powerful oxidant can oxidize, thiosulphate almost quantitatively, to sulphate. In this reaction overall change in oxidation state of manganese will be :

- (A) 5 (B) 1 (C) 0 (D) 3

Official Ans. by NTA (D)

Allen Ans. (D)

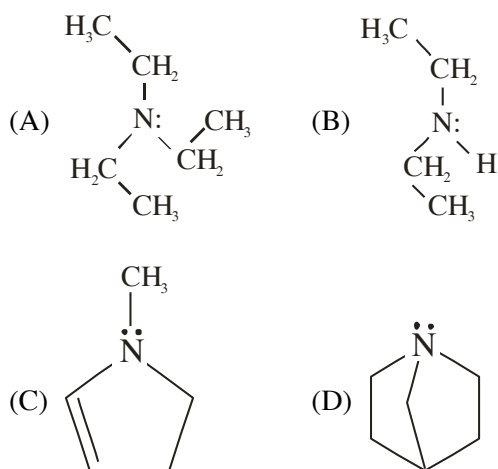
11. Which among the following pairs has only herbicides ?

- (A) Aldrin and Dieldrin
 (B) Sodium chlorate and Aldrin
 (C) Sodium arsenate and Dieldrin
 (D) Sodium chlorate and sodium arsinite.

Official Ans. by NTA (D)

Allen Ans. (D)

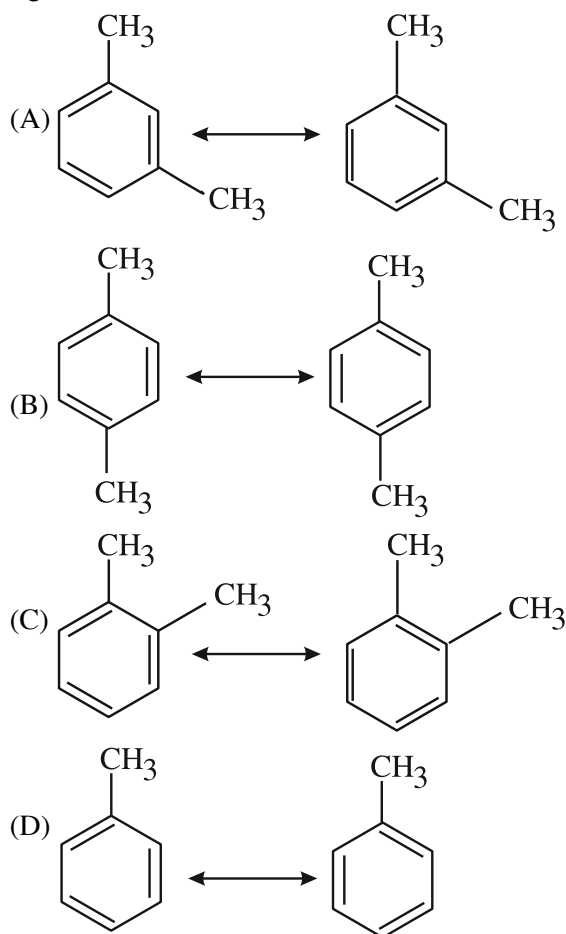
12. Which among the following is the strongest Bronsted base ?



Official Ans. by NTA (D)

Allen Ans. (D)

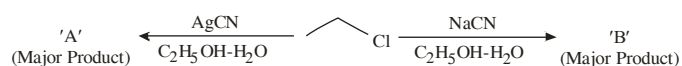
13. Which among the following pairs of the structures will give different products on ozonolysis? (Consider the double bonds in the structures are rigid and not delocalized.)



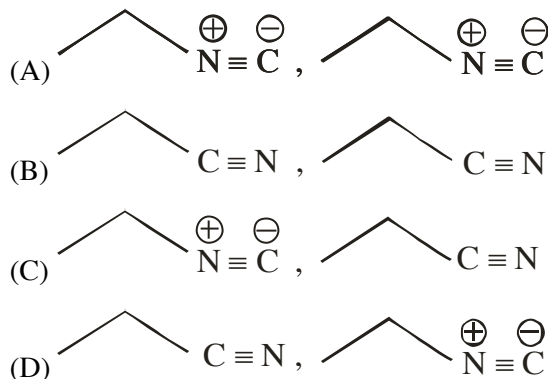
Official Ans. by NTA (C)

Allen Ans. (C)

14.

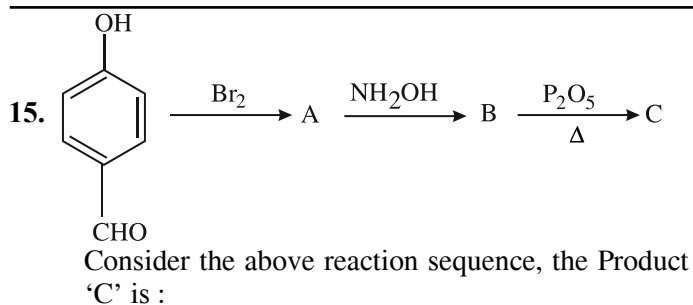


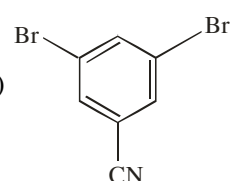
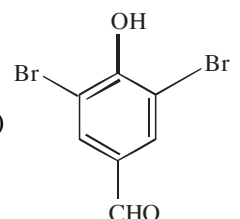
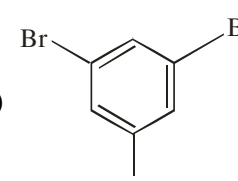
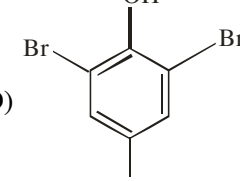
Considering the above reactions, the compound 'A' and compound 'B' respectively are :



Official Ans. by NTA (C)

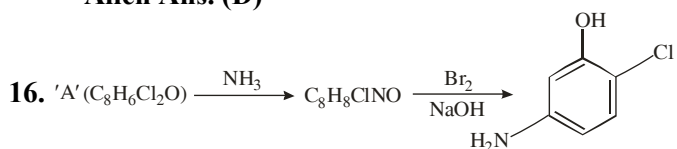
Allen Ans. (C)



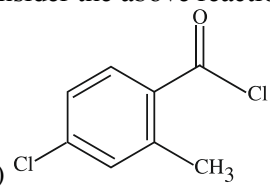
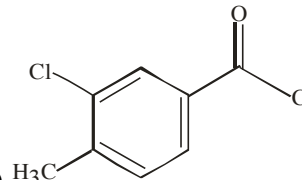
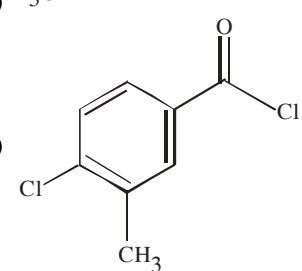
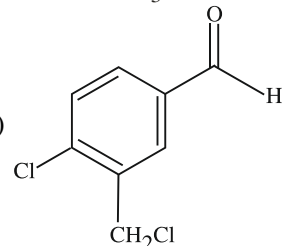
- (A)  (B) 
 (C)  (D) 

Official Ans. by NTA (D)

Allen Ans. (D)

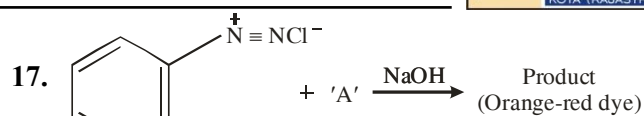


Consider the above reaction, the compound 'A' is :

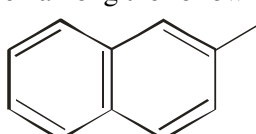
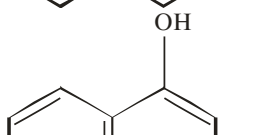
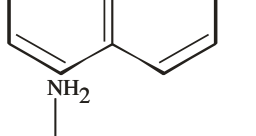
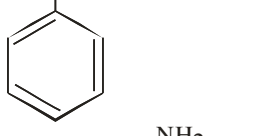
- (A)  (B) 
 (C)  (D) 

Official Ans. by NTA (C)

Allen Ans. (C)



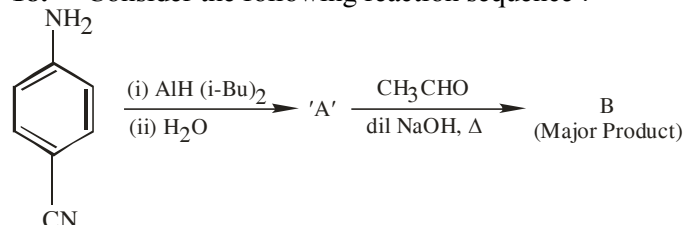
Which among the following represent reagent 'A'?

- (A)  (B) 
 (C)  (D) 

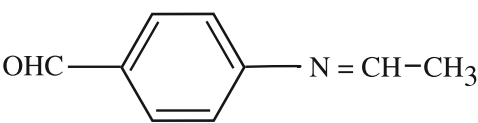
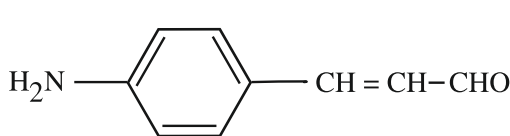
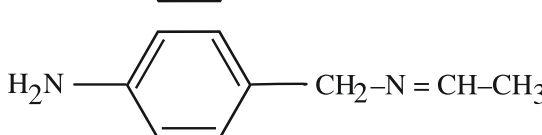
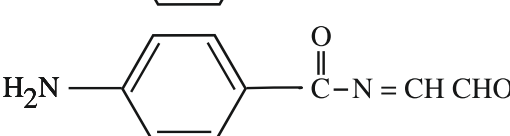
Official Ans. by NTA (A)

Allen Ans. (A)

18. Consider the following reaction sequence :



The product 'B' is :

- (A)  (B) 
 (C)  (D) 

Official Ans. by NTA (B)

Allen Ans. (B)

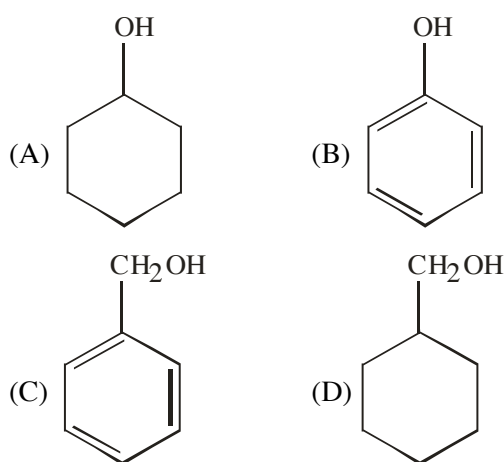
19. Which of the following compounds is an example of hypnotic drug ?

(A) Seldane (B) Amytal
(C) Aspartame (D) Prontosil

Official Ans. by NTA (B)

Allen Ans. (B)

20. A compound 'X' is acidic and it is soluble in NaOH solution, but insoluble in NaHCO₃ solution. Compound 'X' also gives violet colour with neutral FeCl₃ solution. The compound 'X' is :



Official Ans. by NTA (B)

Allen Ans. (B)

SECTION-B

1. Resistance of a conductivity cell (cell constant 129 m⁻¹) filled with 74.5 ppm solution of KCl is 100 Ω (labelled as solution 1). When the same cell is filled with KCl solution of 149 ppm, the resistance is 50 Ω (labelled as solution 2). The ratio of molar conductivity of solution 1 and solution 2 is i.e. $\frac{\Lambda_1}{\Lambda_2}$ = x × 10⁻³. The value of x is ____.

(Nearest integer)

Given, molar mass of KCl is 74.5 g mol⁻¹

Official Ans. by NTA (1000)

Allen Ans. (1000)

2. Ionic radii of cation A⁺ and anion B⁻ are 102 and 181 pm respectively. These ions are allowed to crystallize into an ionic solid. This crystal has cubic close packing for B⁻. A⁺ is present in all octahedral voids. The edge length of the unit cell of the crystal AB is ____ pm. (Nearest Integer)

Official Ans. by NTA (512)

Allen Ans. (566)

3. The minimum uncertainty in the speed of an electron in an one dimensional region of length 2a₀ (Where a₀ = Bohr radius 52.9 pm) is ____ km s⁻¹.
(Given : Mass of electron = 9.1 × 10⁻³¹ kg, Planck's constant h = 6.63 × 10⁻³⁴ Js)

Official Ans. by NTA (548)

Allen Ans. (548)

4. When 600 mL of 0.2 M HNO₃ is mixed with 400 mL of 0.1M NaOH solution in a flask, the rise in temperature of the flask is ____ × 10⁻² °C.
(Enthalpy of neutralisation = 57 kJ mol⁻¹ and Specific heat of water = 4.2 JK⁻¹ g⁻¹)
(Neglect heat capacity of flask)

Official Ans. by NTA (54)

Allen Ans. (54)

5. If O₂ gas is bubbled through water at 303 K, the number of millimoles of O₂ gas that dissolve in 1 litre of water is _____. (Nearest Integer)
(Given : Henry's Law constant for O₂ at 303 K is 46.82 k bar and partial pressure of O₂ = 0.920 bar)
(Assume solubility of O₂ in water is too small, nearly negligible)

Official Ans. by NTA (1)

Allen Ans. (1)

6. If the solubility product of PbS is 8×10^{-28} , then the solubility of PbS in pure water at 298 K is $x \times 10^{-16} \text{ mol L}^{-1}$. The value of x is _____.

(Nearest Integer)

[Given $\sqrt{2} = 1.41$]

Official Ans. by NTA (282)

Allen Ans. (282)

7. The reaction between X and Y is first order with respect to X and zero order with respect to Y.

Experiment	$\frac{[X]}{\text{mol L}^{-1}}$	$\frac{[Y]}{\text{mol L}^{-1}}$	$\frac{\text{Initial rate}}{\text{mol L}^{-1} \text{ min}^{-1}}$
I.	0.1	0.1	2×10^{-3}
II.	L	0.2	4×10^{-3}
III.	0.4	0.4	$M \times 10^{-3}$
IV.	0.1	0.2	2×10^{-3}

Examine the data of table and calculate ratio of numerical values of M and L. (Nearest Integer)

Official Ans. by NTA (40)

Allen Ans. (40)

8. In a linear tetrapeptide (Constituted with different amino acids), (number of amino acids) - (number of peptide bonds) is _____.

Official Ans. by NTA (1)

Allen Ans. (1)

9. In bromination of Propyne, with Bromine 1, 1, 2, 2-tetrabromopropane is obtained in 27% yield. The amount of 1, 1, 2, 2 tetrabromopropane obtained from 1 g of Bromine in this reaction is _____ $\times 10^{-1} \text{ g}$. (Nearest integer)

(Molar Mass : Bromine = 80 g/mol)

Official Ans. by NTA (3)

Allen Ans. (3)

10. $[\text{Fe}(\text{CN})_6]^{3-}$ should be an inner orbital complex. Ignoring the pairing energy, the value of crystal field stabilization energy for this complex is (-) _____ Δ_0 . (Nearest integer)

Official Ans. by NTA (2)

Allen Ans. (2)