FINAL JEE–MAIN EXAMINATION – MARCH, 2021

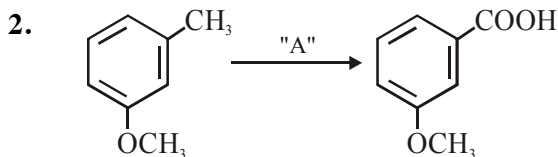## (Held On Tuesday 16th March, 2021) TIME : 3 : 00 PM to 6 : 00 PM

CHEMISTRY	TEST PAPER WITH ANSWER

SECTION-A

1. The green house gas/es is (are) :
(A) Carbon dioxide
(B) Oxygen
(C) Water vapour
(D) Methane
Choose the most appropriate answer from the options given below :
(1) (A) and (C) only
(2) (A) only
(3) (A), (C) and (D) only
(4) (A) and (B) only
Official Ans. by NTA (3)

2.

In the above reaction, the reagent "A" is :
(1) $NaBH_4$, H_3O^+
(2) $LiAlH_4$
(3) Alkaline $KMnO_4$, H^+
(4) HCl, Zn-Hg
Official Ans. by NTA (3)

3. Which of the following reduction reaction CANNOT be carried out with coke ?
(1) $Al_2O_3 \rightarrow Al$
(2) $ZnO \rightarrow Zn$
(3) $Fe_2O_3 \rightarrow Fe$
(4) $Cu_2O \rightarrow Cu$
Official Ans. by NTA (1)

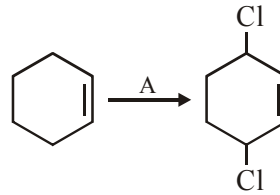**4.** Identify the elements X and Y using the ionisation energy values given below :

Ionization energy	(kJ/mol)	
	1st	2nd
X	495	4563
Y	731	1450

(1) X = Na ; Y = Mg
(2) X = Mg ; Y = F
(3) X = Mg ; Y = Na
(4) X = F ; Y = Mg
Official Ans. by NTA (1)

5.

Identify the reagent(s) 'A' and condition(s) for the reaction :
(1) A = HCl; Anhydrous $AlCl_3$
(2) A = HCl, $ZnCl_2$
(3) A = Cl_2; UV light
(4) A = Cl_2; dark, Anhydrous $AlCl_3$
Official Ans. by NTA (3)

6. The secondary structure of protein is stabilised by :
(1) Peptide bond
(2) glycosidic bond
(3) Hydrogen bonding
(4) van der Waals forces
Official Ans. by NTA (3)

7. Fex_2 and Fey_3 are known when x and y are :
(1) x = F, Cl, Br, I and y = F, Cl, Br
(2) x = F, Cl, Br and y = F, Cl, Br, I
(3) x = Cl, Br, I and y = F, Cl, Br, I
(4) x = F, Cl, Br, I and y = F, Cl, Br, I
Official Ans. by NTA (1)

8. Which of the following polymer is used in the manufacture of wood laminates ?
(1) *cis*-poly isoprene
(2) Melamine formaldehyde resin
(3) Urea formaldehyde resin
(4) Phenol and formaldehyde resin
Official Ans. by NTA (3)

9. **Statement I :** Sodium hydride can be used as an oxidising agent.
Statement II : The lone pair of electrons on nitrogen in pyridine makes it basic.
Choose the CORRECT answer from the options 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 (3)

10. The INCORRECT statement regarding the structure of C_{60} is :
(1) The six-membered rings are fused to both six and five-membered rings.
(2) Each carbon atom forms three sigma bonds.
(3) The five-membered rings are fused only to six-membered rings.
(4) It contains 12 six-membered rings and 24 five-membered rings.
Official Ans. by NTA (4)

11. The correct statements about H_2O_2 are :
(A) used in the treatment of effluents.
(B) used as both oxidising and reducing agents.
(C) the two hydroxyl groups lie in the same plane.
(D) miscible with water.
Choose the correct answer from the options given below :
(1) (A), (B), (C) and (D)
(2) (A), (B) and (D) only
(3) (B), (C) and (D) only
(4) (A), (C) and (D) only
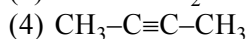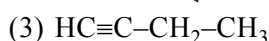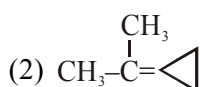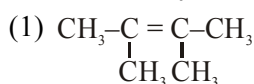**Official Ans. by NTA (2)**

12. Ammonolysis of Alkyl halides followed by the treatment with NaOH solution can be used to prepare primary, secondary and tertiary amines. The purpose of NaOH in the reaction is :
(1) to remove basic impurities
(2) to activate NH_3 used in the reaction
(3) to remove acidic impurities
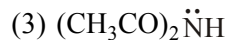(4) to increase the reactivity of alkyl halide
Official Ans. by NTA (3)

13. An unsaturated hydrocarbon X on ozonolysis gives A. Compound A when warmed with ammonical silver nitrate forms a bright silver mirror along the sides of the test tube. The unsaturated hydrocarbon X is :

(1) $CH_3-\underset{\underset{CH_3}{|}}{C} = \underset{\underset{CH_3}{|}}{C}-CH_3$

(2) $CH_3-\underset{\underset{CH_3}{|}}{C}=\triangleleft$

(3) $HC\equiv C-CH_2-CH_3$
(4) $CH_3-C\equiv C-CH_3$
Official Ans. by NTA (3)

14. Which of the following is least basic ?

(1) $(CH_3CO)\overset{..}{N}HC_2H_5$

(2) $(C_2H_5)_3\overset{..}{N}$

(3) $(CH_3CO)_2\overset{..}{N}H$

(4) $(C_2H_5)_2\overset{..}{N}H$

Official Ans. by NTA (3)

15. The characteristics of elements X, Y and Z with atomic numbers, respectively, 33, 53 and 83 are :

(1) X and Y are metalloids and Z is a metal.

(2) X is a metalloid, Y is a non-metal and Z is a metal.

(3) X, Y and Z are metals.

(4) X and Z are non-metals and Y is a metalloid

Official Ans. by NTA (2)

16. Match List-I with List-II

List-I Test/Reagents/Observation(s)	List-II Species detected
(a) Lassaigne's Test	(i) Carbon
(b) Cu(II) oxide	(ii) Sulphur
(c) Silver nitrate	(iii) N, S, P, and halogen
(d) The sodium fusion extract gives black precipitate with acetic acid and lead acetate	(iv) Halogen Specifically

The correct match is :

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

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

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

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

Official Ans. by NTA (3)

17. The INCORRECT statements below regarding colloidal solutions is :

(1) A colloidal solution shows colligative properties.

(2) An ordinary filter paper can stop the flow of colloidal particles.

(3) The flocculating power of Al^{3+} is more than that of Na^+.

(4) A colloidal solution shows Brownian motion of colloidal particles.

Official Ans. by NTA (2)

18. Arrange the following metal complex/compounds in the increasing order of spin only magnetic moment. Presume all the three, high spin system.

(Atomic numbers Ce = 58, Gd = 64 and Eu = 63.)

(a) $(NH_4)_2[Ce(NO_3)_6]$ (b) $Gd(NO_3)_3$ and

(c) $Eu(NO_3)_3$

Answer is :
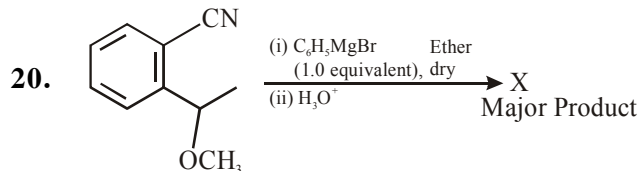
(1) (b) < (a) < (c)

(2) (c) < (a) < (b)

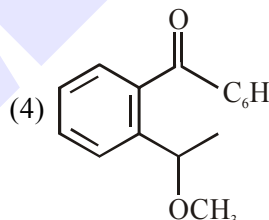(3) (a) < (b) < (c)

(4) (a) < (c) < (b)

Official Ans. by NTA (4)

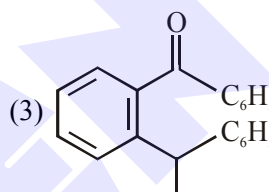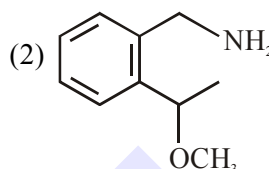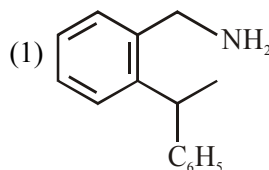**19.** The exact volumes of 1 M NaOH solution required to neutralise 50 mL of 1 M H_3PO_3 solution and 100 mL of 2 M H_3PO_2 solution, respectively, are :

(1) 100 mL and 100 mL

(2) 100 mL and 50 mL

(3) 100 mL and 200 mL

(4) 50 mL and 50 mL

Official Ans. by NTA (3)

20.

The structure of X is :

(1)

(2)

(3)

(4)

Official Ans. by NTA (4)

SECTION-B

1. Ga (atomic mass 70 u) crystallizes in a hexagonal close packed structure. The total number of voids in 0.581 g of Ga is _____ $\times 10^{21}$. (Round off to the Nearest Integer).
   Official Ans. by NTA (15)

2. A 5.0 m mol dm^{-3} aqueous solution of KCl has a conductance of 0.55 mS when measured in a cell constant 1.3 cm^{-1}. The molar conductivity of this solution is _____ $mSm^2 \, mol^{-1}$.
   (Round off to the Nearest Integer)
   Official Ans. by NTA (143)
   Official Ans. by ALLEN (14.3)

3. A and B decompose via first order kinetics with half-lives 54.0 min and 18.0 min respectively. Starting from an equimolar non reactive mixture of A and B, the time taken for the concentration of A to become 16 times that of B is _____ min. (Round off to the Nearest Integer).
   Official Ans. by NTA (108)

4. In Duma's method of estimation of nitrogen, 0.1840 g of an organic compound gave 30 mL of nitrogen collected at 287 K and 758 mm of Hg pressure. The percentage composition of nitrogen in the compound is _____. (Round off to the Nearest Integer).
   [Given : Aqueous tension at 287 K = 14 mm of Hg]
   Official Ans. by NTA (19)

5. The number of orbitals with n = 5, m_1 = + 2 is _____. (Round off to the Nearest Integer).
   Official Ans. by NTA (3)

6. At 363 K, the vapour pressure of A is 21 kPa and that of B is 18 kPa. One mole of A and 2 moles of B are mixed. Assuming that this solution is ideal, the vapour pressure of the mixture is _____ kPa. (Round of to the Nearest Integer).
   Official Ans. by NTA (19)

7. Sulphurous acid (H_2SO_3) has $Ka_1 = 1.7 \times 10^{-2}$ and $Ka_2 = 6.4 \times 10^{-8}$. The pH of 0.588 M H_2SO_3 is _____. (Round off to the Nearest Integer)
   Official Ans. by NTA (1)

8. When 35 mL of 0.15 M lead nitrate solution is mixed with 20 mL of 0.12 M chromic sulphate solution, _____ $\times 10^{-5}$ moles of lead sulphate precipitate out. (Round off to the Nearest Integer).
   Official Ans. by NTA (525)

9. At 25°C, 50 g of iron reacts with HCl to form $FeCl_2$. The evolved hydrogen gas expands against a constant pressure of 1 bar. The work done by the gas during this expansion is _____ J.
   (Round off to the Nearest Integer)
   [Given : R = 8.314 J mol^{-1} K^{-1}. Assume, hydrogen is an ideal gas]
   [Atomic mass off Fe is 55.85 u]
   Official Ans. by NTA (2218)

10. $[Ti(H_2O)_6]^{3+}$ absorbs light of wavelength 498 nm during a d – d transition. The octahedral splitting energy for the above complex is _____ $\times 10^{-19}$ J. (Round off to the Nearest Integer). h = 6.626×10^{-34} Js; c = 3×10^8 ms^{-1}.
    Official Ans. by NTA (4)