

FINAL JEE–MAIN EXAMINATION – JULY, 2021

Held On Tuesday 20th July, 2021

TIME: 9:00 AM to 12:00 NOON

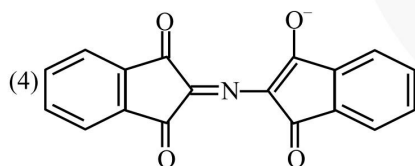
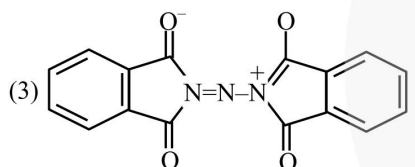
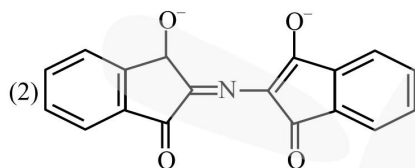
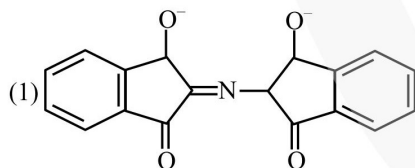
SECTION-A

1. According to the valence bond theory the hybridization of central metal atom is dsp^2 for which one of the following compounds?

- (1) $NiCl_2 \cdot 6H_2O$ (2) $K_2[Ni(CN)_4]$
 (3) $[Ni(CO)_4]$ (4) $Na_2[NiCl_4]$

Official Ans. by NTA (2)

2. The correct structure of Rhumann's Purple, the compound formed in the reaction of ninhydrin with proteins is :



Official Ans. by NTA (4)

3. Green chemistry in day-to-day life is in the use of:

- (1) Chlorine for bleaching of paper
 (2) Large amount of water alone for washing clothes
 (3) Tetrachloroethene for laundry
 (4) Liquefied CO_2 for dry cleaning of clothes

Official Ans. by NTA (4)

4. The correct order of intensity of colors of the compounds is :

- (1) $[Ni(CN)_4]^{2-} > [NiCl_4]^{2-} > [Ni(H_2O)_6]^{2+}$
 (2) $[Ni(H_2O)_6]^{2+} > [NiCl_4]^{2-} > [Ni(CN)_4]^{2-}$
 (3) $[NiCl_4]^{2-} > [Ni(H_2O)_6]^{2+} > [Ni(CN)_4]^{2-}$
 (4) $[NiCl_4]^{2-} > [Ni(CN)_4]^{2-} > [Ni(H_2O)_6]^{2+}$

Official Ans. by NTA (3)

5. The set in which compounds have different nature is :

- (1) $B(OH)_3$ and H_3PO_3
 (2) $B(OH)_3$ and $Al(OH)_3$
 (3) $NaOH$ and $Ca(OH)_2$
 (4) $Be(OH)_2$ and $Al(OH)_3$

Official Ans. by NTA (2)

6. The species given below that does NOT show disproportionation reaction is :

- (1) BrO_4^- (2) BrO^-
 (3) BrO_2^- (4) BrO_3^-

Official Ans. by NTA (1)

7. Given below are two statements. One is labelled as Assertion A and the other is labelled as Reason R. Assertion A : Sharp glass edge becomes smooth on heating it upto its melting point.

Reason R : The viscosity of glass decreases on melting.

Choose the most appropriate answer from the options given below.

- (1) A is true but R is false
 (2) Both A and R are true but R is NOT the correct explanation of A.
 (3) A is false but R is true.
 (4) Both A and R are true and R is the correct explanation of A.

Official Ans. by NTA (2)

8. Orlon fibres are made up of :

- (1) Polyacrylonitrile (2) Polyesters
 (3) Polyamide (4) Cellulose

Official Ans. by NTA (1)



9. Given below are two statements : One is labelled as **Assertion A** and other is labelled as **Reason R**.
Assertion A : The dihedral angles in H_2O_2 in gaseous phase is 90.2° and in solid phase is 111.5° .
Reason R : The change in dihedral angle in solid and gaseous phase is due to the difference in the intermolecular forces.

Choose the most appropriate answer from the options given below for **A** and **R**.

- (1) **A** is correct but **R** is not correct.
 (2) Both **A** and **R** are correct but **R** is not the correct explanation of **A**.
 (3) Both **A** and **R** are correct and **R** is the correct explanation of **A**.
 (4) **A** is not correct but **R** is correct.

Official Ans. by NTA (4)

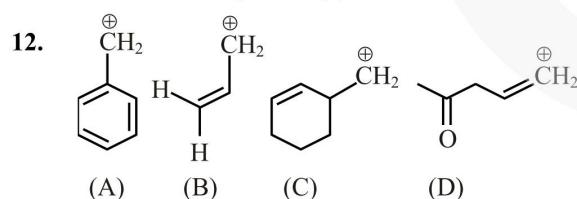
10. Chemical nature of the nitrogen oxide compound obtained from a reaction of concentrated nitric acid and P_4O_{10} (in 4 : 1 ratio) is :
 (1) acidic (2) basic
 (3) amphoteric (4) neutral

Official Ans. by NTA (1)

11. An inorganic Compound '**X**' on treatment with concentrated H_2SO_4 produces brown fumes and gives dark brown ring with $FeSO_4$ in presence of concentrated H_2SO_4 . Also Compound '**X**' gives precipitate '**Y**', when its solution in dilute HCl is treated with H_2S gas. The precipitate '**Y**' on treatment with concentrated HNO_3 followed by excess of NH_4OH further gives deep blue coloured solution, Compound '**X**' is:

- (1) $Co(NO_3)_2$ (2) $Pb(NO_2)_2$
 (3) $Cu(NO_3)_2$ (4) $Pb(NO_3)_2$

Official Ans. by NTA (3)



Among the given species the Resonance stabilised carbocations are:

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

Official Ans. by NTA (3)

13. A s-block element (**M**) reacts with oxygen to form an oxide of the formula MO_2 . The oxide is pale yellow in colour and paramagnetic. The element (**M**) is:

- (1) Mg (2) Na
 (3) Ca (4) K

Official Ans. by NTA (4)

14. In the given reaction 3-Bromo-2, 2-dimethyl butane $\xrightarrow{C_2H_5OH}$ 'A' (Major Product) Product A is:

- (1) 2-Ethoxy-3, 3-dimethyl butane
 (2) 1-Ethoxy-3, 3-dimethyl butane
 (3) 2-Ethoxy-2, 3-dimethyl butane
 (4) 2-Hydroxy-3, 3-dimethyl butane

Official Ans. by NTA (3)

15. The metal that can be purified economically by fractional distillation method is:

- (1) Fe (2) Zn (3) Cu (4) Ni

Official Ans. by NTA (2)

16. Compound **A** is converted to **B** on reaction with $CHCl_3$ and KOH . The compound **B** is toxic and can be decomposed by **C**. **A**, **B** and **C** respectively are :

- (1) primary amine, nitrile compound, conc. HCl
 (2) secondary amine, isonitrile compound, conc. $NaOH$
 (3) primary amine, isonitrile compound, conc. HCl
 (4) secondary amine, nitrile compound, conc. $NaOH$

Official Ans. by NTA (3)

17. The conditions given below are in the context of observing Tyndall effect in colloidal solutions:

- (A) The diameter of the colloidal particles is comparable to the wavelength of light used.
 (B) The diameter of the colloidal particles is much smaller than the wavelength of light used.
 (C) The diameter of the colloidal particles is much larger than the wavelength of light used.
 (D) The refractive indices of the dispersed phase and the dispersion medium are comparable.
 (E) The dispersed phase has a very different refractive index from the dispersion medium.

Choose the most appropriate conditions from the options given below:

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

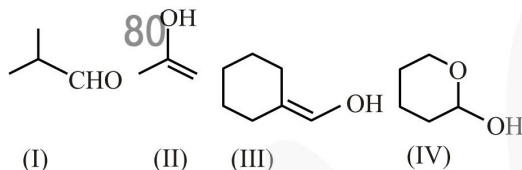
Official Ans. by NTA (1)



18. Identify the incorrect statement from the following
- (1) Amylose is a branched chain polymer of glucose
 - (2) Starch is a polymer of α -D glucose
 - (3) β -Glycosidic linkage makes cellulose polymer
 - (4) Glycogen is called as animal starch

Official Ans. by NTA (1)

19.

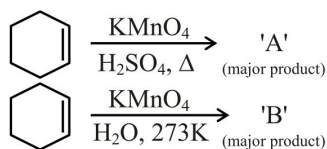


Which among the above compound/s does/do not form Silver mirror when treated with Tollen's reagent?

- (1) (I), (III) and (IV) only
- (2) Only (IV)
- (3) Only (II)
- (4) (III) and (IV) only

Official Ans. by NTA (3)

20.



For above chemical reactions, identify the correct statement from the following:

- (1) Both compound 'A' and compound 'B' are dicarboxylic acids
- (2) Both compound 'A' and compound 'B' are diols
- (3) Compound 'A' is diol and compound 'B' is dicarboxylic acid
- (4) Compound 'A' is dicarboxylic acid and compound 'B' is diol

Official Ans. by NTA (4)

SECTION-B

1. The number of lone pairs of electrons on the central I atom in I_3^- is _____.

Official Ans. by NTA (3)

2. 250 mL of 0.5 M NaOH was added to 500 mL of 1 M HCl. The number of unreacted HCl molecules in the solution after complete reaction is _____ $\times 10^{21}$. (Nearest integer)

($N_A = 6.022 \times 10^{23}$)

Official Ans. by NTA (226)

3. The Azimuthal quantum number for the valence electrons of Ga^+ ion is _____. (Atomic number of Ga = 31)

Official Ans. by NTA (0)

4. The spin-only magnetic moment value for the complex $[Co(CN)_6]^{4-}$ is _____ BM. [At. no. of Co = 27]

Official Ans. by NTA (2)

5. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

In an equilibrium mixture, the partial pressures are

$P_{SO_3} = 43 \text{ kPa}$; $P_{O_2} = 530 \text{ Pa}$ and

$P_{SO_2} = 45 \text{ kPa}$. The equilibrium constant

$K_p = \text{_____} \times 10^{-2}$. (Nearest integer)

Official Ans. by NTA (172)

6. The number of nitrogen atoms in a semicarbazone molecule of acetone is _____.

Official Ans. by NTA (3)

7. To synthesise 1.0 mole of 2-methylpropan-2-ol from Ethylethanoate _____ equivalents of CH_3MgBr reagent will be required. (Integer value)

Official Ans. by NTA (2)



8. The inactivation rate of a viral preparation is proportional to the amount of virus. In the first minute after preparation, 10% of the virus is inactivated. The rate constant for viral inactivation is _____ $\times 10^{-3} \text{ min}^{-1}$. (Nearest integer)

[Use : $\ln 10 = 2.303$; $\log_{10} 3 = 0.477$;

property of logarithm : $\log x^y = y \log x$]

Official Ans. by NTA (106)

9. An average person needs about 10000 kJ energy per day. The amount of glucose (molar mass = 180.0 g mol^{-1}) needed to meet this energy requirement is _____ g.

(Use : $\Delta_c H(\text{glucose}) = -2700 \text{ kJ mol}^{-1}$)

Official Ans. by NTA (667)

10. At 20°C , the vapour pressure of benzene is 70 torr and that of methyl benzene is 20 torr. The mole fraction of benzene in the vapour phase at 20°C above an equimolar mixture of benzene and methyl benzene is _____ $\times 10^{-2}$. (Nearest integer)

Official Ans. by NTA (78)