FINAL JEE–MAIN EXAMINATION – SEPTEMBER, 2020

(On Friday 04th SEPTEMBER, 2020) TIME : 3 PM to 6 PM

CHEMISTRY

TEST PAPER WITH ANSWER

1. If the equilibrium constant for $A \rightleftharpoons B + C$ is $K_{eq}^{(1)}$ and that of $B + C \rightleftharpoons P$ is $K_{eq}^{(2)}$, the equilibrium constant for $A \rightleftharpoons P$ is :-

(1) $K_{eq}^{(2)} - K_{eq}^{(1)}$ (2) $K_{eq}^{(1)} K_{eq}^{(2)}$

(3) $K_{eq}^{(1)} / K_{eq}^{(2)}$ (4) $K_{eq}^{(1)} + K_{eq}^{(2)}$

Official Ans. by NTA (2)

2. Five moles of an ideal gas at 1 bar and 298 K is expanded into vacuum to double the volume. The work done is :-

(1) $C_V(T_2 - T_1)$ (2) $-RT \ln V_2/V_1$

(3) $-RT(V_2 - V_1)$ (4) zero

Official Ans. by NTA (4)

3. The process that is NOT endothermic in nature is

(1) $Ar_{(g)} + e^- \rightarrow Ar_{(g)}^-$ (2) $H_{(g)} + e^- \rightarrow H_{(g)}^-$

(3) $Na_{(g)} \rightarrow Na_{(g)}^+ + e^-$ (4) $O_{(g)}^- + e^- \rightarrow O_{(g)}^{2-}$

Official Ans. by NTA (2)

4. The crystal Field stabilization Energy (CFSE) of $[CoF_3(H_2O)_3](\Delta_0 < P)$ is :-

(1) $-0.8\ \Delta_0$ (2) $-0.4\ \Delta_0 + P$

(3) $-0.8\ \Delta_0 + 2P$ (4) $-0.4\ \Delta_0$

Official Ans. by NTA (4)

5. The mechanism of action of "Terfenadine" (Seldane) is :-

(1) Activates the histamine receptor

(2) Inhibits the secretion of histamine

(3) Inhibits the action of histamine receptor

(4) Helps in the secretion of histamine

Official Ans. by NTA (3)

6. An alkaline earth metal 'M' readily forms water soluble sulphate and water insoluble hydroxide. Its oxide MO is very stable to heat and does not have rock-salt structure. M is :-

(1) Ca (2) Be (3) Mg (4) Sr

Official Ans. by NTA (2)

7. The reaction in which the hybridisation of the underlined atom is affected is :-

(1) $\underline{N}H_3 \xrightarrow{H^+}$

(2) $\underline{Xe}F_4 + SbF_5 \rightarrow$

(3) $H_2\underline{S}O_4 + NaCl \xrightarrow{420\ K}$

(4) $H_3\underline{P}O_2 \xrightarrow{\text{Disproportionation}}$

Official Ans. by NTA (2)

8. The one that can exhibit highest paramagnetic behaviour among the following is :-

gly = glycinato; bpy = 2, 2'-bipyridine

(1) $[Pd(gly)_2]$

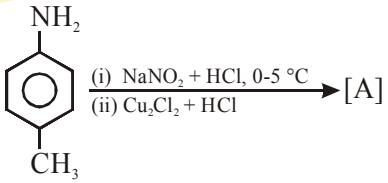
(2) $[Ti(NH_3)_6]^{3+}$

(3) $[Co(OX)_2(OH)_2]^-$ $(\Delta_0 > P)$

(4) $[Fe(en)(bpy)(NH_3)_2]^{2+}$

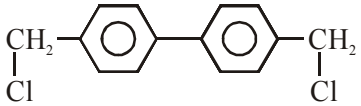
Official Ans. by NTA (3)

9. In the following reaction sequence, [C] is :-



$\xrightarrow[h\nu]{Cl_2}$ [B] $\xrightarrow{Na+dry\ ether}$ [C]

(Major Product)

(1) 

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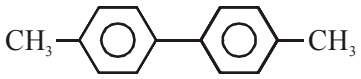
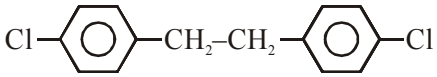
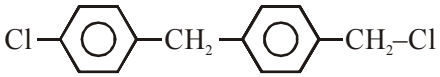
(2) 

(3) 

(4) 

Official Ans. by NTA (3)

10. A sample of red ink (a colloidal suspension) is prepared by mixing eosin dye, egg white, HCHO and water. The component which ensures stability of the ink sample is :-

(1) HCHO (2) Eosin dye

(3) Egg white (4) Water

Official Ans. by NTA (3)

11. The processes of calcination and roasting in metallurgical industries, respectively, can lead to :-

(1) Global warming and acid rain

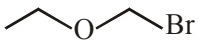
(2) Photochemical smog and ozone layer depletion

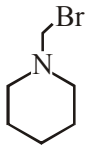
(3) Global warming and photochemical smog

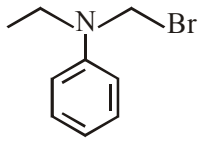
(4) Photochemical smog and global warming

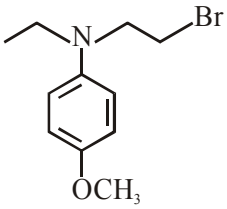
Official Ans. by NTA (1)

12. Which of the following compounds will form the precipitate with aq. $AgNO_3$ solution most readily ?

(1) 

(2) 

(3) 

(4) 

Official Ans. by NTA (2)

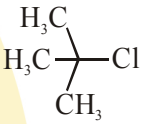
13. The molecule in which hybrid MOs involve only one d-orbital of the central atom is :-

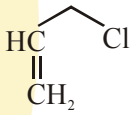
(1) $[Ni(CN)_4]^{2-}$ (2) $[CrF_6]^{3-}$

(3) BrF_5 (4) XeF_4

Official Ans. by NTA (1)

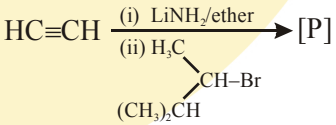
14. Among the following compounds, which one has the shortest C—Cl bond ?

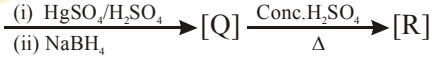
(1) $H_3C–Cl$ (2) 

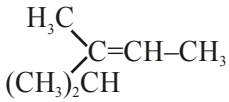
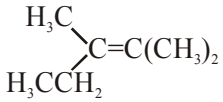
(3)  (4) 

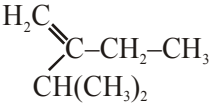
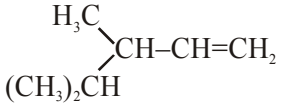
Official Ans. by NTA (3)

15. The major product [R] in the following sequence of reactions is :-





(1)  (2) 

(3)  (4) 

Official Ans. by NTA (2)

16. The incorrect statement(s) among (a) - (c) is (are) :-

(a) W(VI) is more stable than Cr(VI).

(b) in the presence of HCl, permanganate titrations provide satisfactory results.

(c) some lanthanoid oxides can be used as phosphors.

(1) (a) and (b) only (2) (a) only

(3) (b) and (c) only (4) (b) only

Official Ans. by NTA (4)

17. 250 mL of a waste solution obtained from the workshop of a goldsmith contains 0.1 M $AgNO_3$ and 0.1 M AuCl. The solution was electrolyzed at 2 V by passing a current of 1 A for 15 minutes. The metal/metals electrodeposited will be :-

$\left(E^0_{Ag^+/Ag} = 0.80V,\ E^0_{Au^+/Au} = 1.69V\right)$

(1) only silver

(2) only gold

(3) silver and gold in equal mass proportion

(4) silver and gold in proportion to their atomic weights

Official Ans. by NTA (4)

18. The major product [B] in the following reactions is :-

$$CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-OCH_2-CH_3 \xrightarrow[\text{Heat}]{HI} [A]\ \text{alcohol} \xrightarrow[\Delta]{H_2SO_4} [B]$$

(1) $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{C}}=CH_2$

(2) $CH_3-CH_2-CH=CH-CH_3$

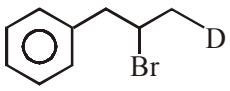
(3) $CH_2=CH_2$

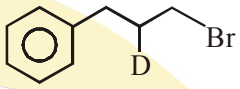
(4) $CH_3-CH=\underset{\displaystyle CH_3}{\underset{|}{C}}-CH_3$

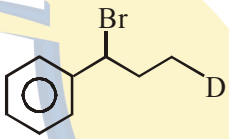
Official Ans. by NTA (4)

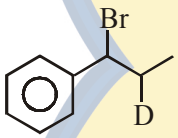
19. The major product [C] of the following reaction sequence will be :-

$$CH_2=CH-CHO \xrightarrow[(ii)\ SOCl_2]{(i)\ NaBH_4} [A] \xrightarrow[Anhy.\ AlCl_3]{} [B] \xrightarrow{DBr} [C]$$

(1) 

(2) 

(3) 

(4) 

Official Ans. by NTA (3)

20. The shortest wavelength of H atom is the Lyman series is λ_1. The longest wavelength in the Balmer series of He^+ is :-

(1) $\frac{5\lambda_1}{9}$ (2) $\frac{27\lambda_1}{5}$ (3) $\frac{9\lambda_1}{5}$ (4) $\frac{36\lambda_1}{5}$

Official Ans. by NTA (3)

21. A 100 mL solution was made by adding 1.43 g of $Na_2CO_3 \cdot xH_2O$. The normality of the solution is 0.1 N. The value of x is _____.

(The atomic mass of Na is 23g/mol) :-

Official Ans. by NTA (10)

22. The osmotic pressure of a solution of NaCl is 0.10 atm and that of a glucose solution is 0.20 atm. The osmotic pressure of a solution formed by mixing 1 L of the sodium chloride solution with 2 L of the glucose solution is $x \times 10^{-3}$ atm. x is _____. (nearest integer) :-

Official Ans. by NTA (167)

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23. The number of chiral centres present in threonine is _____.

Official Ans. by NTA (2)

24. Consider the following equations :

$2\ Fe^{2+} + H_2O_2 \rightarrow x\ A + y\ B$

(in basic medium)

$2MnO_4^- + 6H^+ + 5H_2O_2 \rightarrow x'\ C + y'\ D + z'\ E$

(in acidic medium)

The sum of the stoichiometric coefficients x, y, x', y' and z' for products A, B, C, D and E, respectively, is _____.

Official Ans. by NTA (19)

25. The number of molecules with energy greater than the threshold energy for a reaction increases five fold by a rise of temperature from 27 °C to 42 °C. Its energy of activation in J/mol is _____. (Take ln 5 = 1.6094; R = 8.314 J $mol^{-1}K^{-1}$)

Official Ans. by NTA (84297)

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