

FINAL JEE-MAIN EXAMINATION – JANUARY, 2020
(Held On Tuesday 07th JANUARY, 2020) TIME : 2 : 30 PM to 5 : 30 PM
CHEMISTRY
TEST PAPER WITH ANSWER

1. Within each pair of elements of F & Cl, S & Se, and Li & Na, respectively, the elements that release more energy upon an electron gain are-
- (1) F, Se and Na
 - (2) F, S and Li
 - (3) Cl, S and Li
 - (4) Cl, Se and Na

NTA Ans. (3)
ALLEN Ans. (3)

2. The redox reaction among the following is :
- (1) Combination of dinitrogen with dioxygen at 2000 K
 - (2) Formation of ozone from atmospheric oxygen in the presence of sunlight
 - (3) Reaction of H_2SO_4 with NaOH
 - (4) Reaction of $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_3$ with AgNO_3

NTA Ans. (1)
ALLEN Ans. (1)

3. Among the statements(a)-(d), the incorrect ones are-
- (a) Octahedral Co(III) complexes with strong field ligands have very high magnetic moments
 - (b) When $\Delta_0 < P$, the d-electron configuration of Co(III) in an octahedral complex is $t_{eg}^4 e_g^2$
 - (c) Wavelength of light absorbed by $[\text{Co}(\text{en})_3]^{3+}$ is lower than that of $[\text{CoF}_6]^{3-}$
 - (d) If the Δ_0 for an octahedral complex of Co(III) is $18,000 \text{ cm}^{-1}$, the Δ_t for its tetrahedral complex with the same ligand will be $16,000 \text{ cm}^{-1}$
- (1) (a) and (b) only
 - (2) (c) and (d) only
 - (3) (b) and (c) only
 - (4) (a) and (d) only

NTA Ans. (4)
ALLEN Ans. (4)

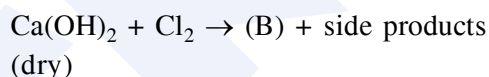
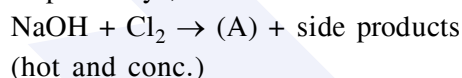
4. The number of possible optical isomers for the complexes MA_2B_2 with sp^3 and dsp^2 hybridised metal atom, respectively, is :

Note : A and B are unidentate neutral and unidentate monoanionic ligands, respectively

- (1) 0 and 0
- (2) 0 and 2
- (3) 0 and 1
- (4) 2 and 2

NTA Ans. (1)
ALLEN Ans. (1)

5. In the following reactions products(A) and (B), respectively, are :



- (1) NaClO_3 and $\text{Ca}(\text{OCl})_2$
- (2) NaOCl and $\text{Ca}(\text{ClO}_3)_2$
- (3) NaClO_3 and $\text{Ca}(\text{ClO}_3)_2$
- (4) NaOCl and $\text{Ca}(\text{OCl})_2$

NTA Ans. (1)
ALLEN Ans. (1)

6. Which of the following statements is correct-
- (1) Gluconic acid can form cyclic (acetal/hemiacetal) structure
 - (2) Gluconic acid is a partial oxidation product of glucose
 - (3) Gluconic acid is obtained by oxidation of glucose with HNO_3
 - (4) Gluconic acid is a dicarboxylic acid

NTA Ans. (2)
ALLEN Ans. (2)

7. The bond order and the magnetic characteristics of CN^- are :

- (1) 3, diamagnetic
- (2) $2\frac{1}{2}$, paramagnetic
- (3) 3, paramagnetic
- (4) $2\frac{1}{2}$, diamagnetic

NTA Ans. (1)
ALLEN Ans. (1)

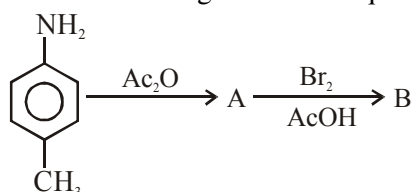
8. The equation that is incorrect is -

- (1) $(\Lambda_m^0)_{NaBr} - (\Lambda_m^0)_{NaI} = (\Lambda_m^0)_{KBr} - (\Lambda_m^0)_{NaBr}$
- (2) $(\Lambda_m^0)_{H_2O} = (\Lambda_m^0)_{HCl} + (\Lambda_m^0)_{NaOH} - (\Lambda_m^0)_{NaCl}$
- (3) $(\Lambda_m^0)_{KCl} - (\Lambda_m^0)_{NaCl} = (\Lambda_m^0)_{KBr} - (\Lambda_m^0)_{NaBr}$
- (4) $(\Lambda_m^0)_{NaBr} - (\Lambda_m^0)_{NaCl} = (\Lambda_m^0)_{KBr} - (\Lambda_m^0)_{KCl}$

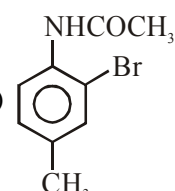
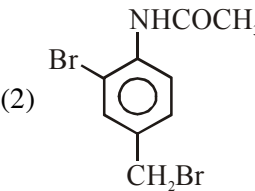
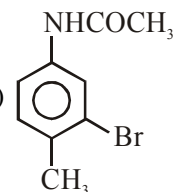
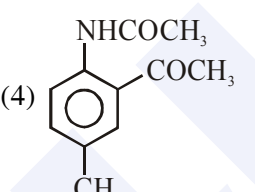
NTA Ans. (1)

ALLEN Ans. (1)

9. In the following reaction sequence



the major products B is -

- (1) 
- (2) 
- (3) 
- (4) 

NTA Ans. (1)

ALLEN Ans. (1)

10. Two open beakers one containing a solvent and the other containing a mixture of that solvent with a non volatile solute are together sealed in a container. Over time -

- (1) The volume of the solution does not change and the volume of the solvent decreases
- (2) The volume of the solution decrease and the volume of the solvent increases
- (3) The volume of the solution increase and the volume of the solvent decreases
- (4) The volume of the solution and the solvent does not change

NTA Ans. (3)

ALLEN Ans. (3)

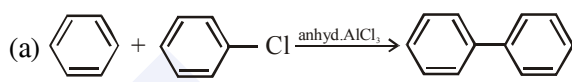
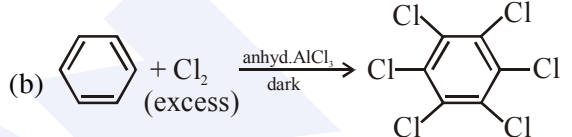
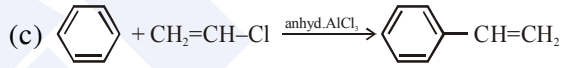
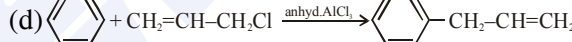
11. A chromatography column, packed with silica gel as stationary phase, was used to separate a mixture of compounds consisting of (A) benzanilide (B) aniline and (C) acetophenone. When the column is eluted with a mixture of solvents, hexane : ethyl acetate (20 : 80), the sequence of obtained compounds :

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

NTA Ans. (2)

ALLEN Ans. (2)

12. Consider the following reactions :

- (a) 
- (b) 
- (c) 
- (d) 

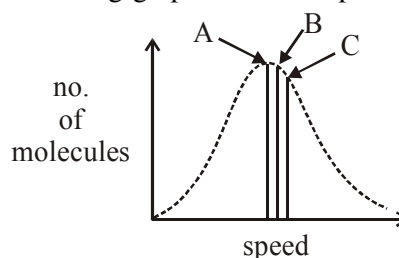
Which of these reactions are possible ?

- (1) (a) and (d)
- (2) (b) and (d)
- (3) (a) and (b)
- (4) (b), (c) and (d)

NTA Ans. (2)

ALLEN Ans. (2)

13. Identify the correct labels of A, B and C in the following graph from the options given below:



Root mean square speed (V_{rms}) ; most probable speed (V_{mp}) ; Average speed (V_{av})

- (1) A - V_{rms} ; B - V_{mp} ; C - V_{av}
- (2) A - V_{av} ; B - V_{rms} ; C - V_{mp}
- (3) A - V_{mp} ; B - V_{rms} ; C - V_{av}
- (4) A - V_{mp} ; B - V_{av} ; C - V_{rms}

NTA Ans. (4)

ALLEN Ans. (4)

14. Among the statements (a) - (d), the correct ones are -

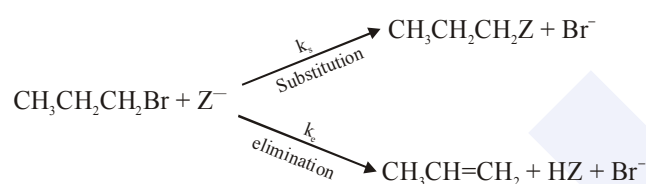
- (a) Decomposition of hydrogen peroxide gives dioxygen
 (b) Like hydrogen peroxide, compounds, such as KClO_3 , $\text{Pb}(\text{NO}_3)_2$ and NaNO_3 when heated liberated dioxygen
 (c) 2-Ethylantraquinone is useful for the industrial preparation of hydrogen peroxide.
 (d) Hydrogen peroxide is used for the manufacture of sodium perborate

- (1) (a), (b) and (c) only
 (2) (a) and (c) only
 (3) (a), (b), (c) and (d)
 (4) (a), (c) and (d) only

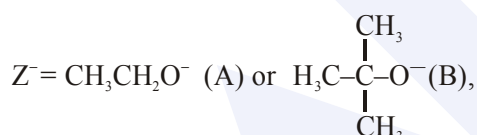
NTA Ans. (3)

ALLEN Ans. (3)

15. For the following reactions :



where



k_s and k_e , are, respectively, the rate constants for the substitution and elimination, and $\mu =$

$\frac{k_s}{k_e}$, the correct options is -

- (1) $\mu_B > \mu_A$ and $k_e(\text{B}) > k_e(\text{A})$
 (2) $\mu_B > \mu_A$ and $k_e(\text{A}) > k_e(\text{B})$
 (3) $\mu_A > \mu_B$ and $k_e(\text{B}) > k_e(\text{A})$
 (4) $\mu_A > \mu_B$ and $k_e(\text{A}) > k_e(\text{B})$

NTA Ans. (3)

ALLEN Ans. (3)

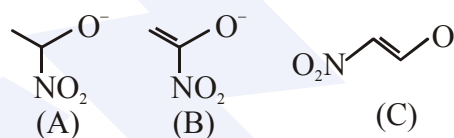
16. The refining method used when the metal and the impurities have low and high melting temperatures, respectively, is -

- (1) zone refining
 (2) liquation
 (3) vapour phase refining
 (4) distillation

NTA Ans. (2)

ALLEN Ans. (1)

17. The correct order of stability for the following alkoxides is :



- (1) (C) > (B) > (A)
 (2) (C) > (A) > (B)
 (3) (B) > (C) > (A)
 (4) (B) > (A) > (C)

NTA Ans. (1)

ALLEN Ans. (1)


18. The ammonia (NH_3) released on quantitative reaction of 0.6 g urea (NH_2CONH_2) with sodium hydroxide (NaOH) can be neutralized by :

- (1) 100 ml of 0.1 N HCl
 (2) 200 ml of 0.4 N HCl
 (3) 100 ml of 0.2 N HCl
 (4) 200 ml of 0.2 N HCl

NTA Ans. (3)

ALLEN Ans. (3)


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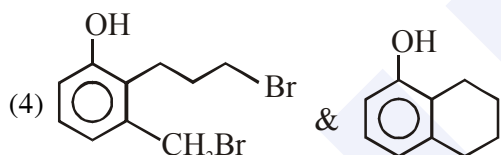
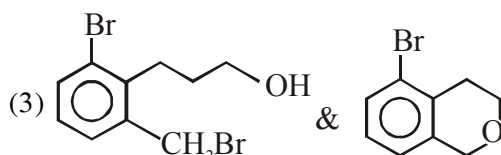
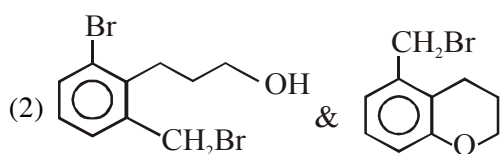
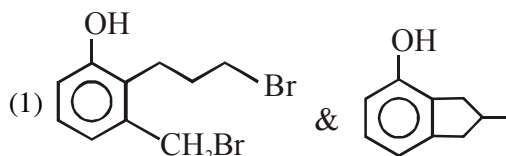
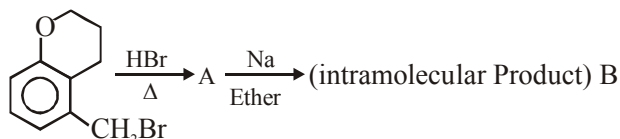
AIR
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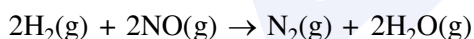
19. In the following reaction sequence, structures of A and B, respectively will be :



NTA Ans. (4)

ALLEN Ans. (4)

20. For the reaction



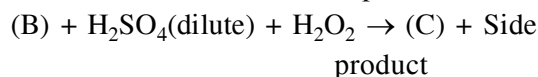
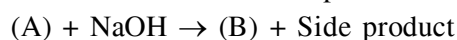
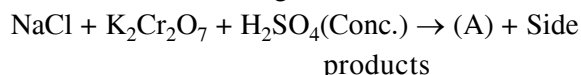
the observed rate expression is, rate = $k_f[\text{NO}]^2[\text{H}_2]$. The rate expression of the reverse reaction is :

- (1) $k_b[\text{N}_2][\text{H}_2\text{O}]^2/[\text{NO}]$ (2) $k_b[\text{N}_2][\text{H}_2\text{O}]$
 (3) $k_b[\text{N}_2][\text{H}_2\text{O}]^2$ (4) $k_b[\text{N}_2][\text{H}_2\text{O}]^2/[\text{H}_2]$

NTA Ans. (4)

ALLEN Ans. (4)

21. Consider the following reactions :



The sum of the total number of atoms in one molecule each of (A), (B) and (C) is

NTA Ans. (18.00 to 18.00)

ALLEN Ans. (18.00)

22. 3g of acetic acid is added to 250 mL of 0.1 M HCl and the solution made up to 500 mL.

To 20 mL of this solution $\frac{1}{2}$ mL of 5 M NaOH

is added. The pH of the solution is _____.

[Given : pK_a of acetic acid = 4.75, molar mass of acetic acid = 60 g/mol, $\log 3 = 0.4771$]

Neglect any changes in volume

NTA Ans. (5.22 to 5.24)

ALLEN Ans. (5.22 or 5.23)

23. The standard heat of formation ($\Delta_f H_{298}^0$) of ethane in (kJ/mol), if the heat of combustion of ethane, hydrogen and graphite are -1560, -393.5 and -286 kJ/mol, respectively is _____

NTA Ans. (-192.00 to -193.00)

ALLEN Ans. (-192.5)

24. The flocculation value of HCl for arsenic sulphide sol. is 30 m mole L^{-1} . If H_2SO_4 is used for the flocculation of arsenic sulphide, the amount, in grams, of H_2SO_4 in 250 ml required for the above purpose is _____.

(molecular mass of $\text{H}_2\text{SO}_4 = 98 \text{ g/mol}$)

NTA Ans. (0.36 to 0.38)

ALLEN Ans. (0.36 or 0.37)

25. The number of sp^2 hybridised carbons present in "Aspartame" is _____.

NTA Ans. (9.00 to 9.00)

ALLEN Ans. (9.00)