

FINAL JEE-MAIN EXAMINATION – SEPTEMBER, 2020

(Held On Thursday 03rd SEPTEMBER, 2020) TIME : 9 AM to 12 PM

CHEMISTRY

TEST PAPER WITH ANSWER

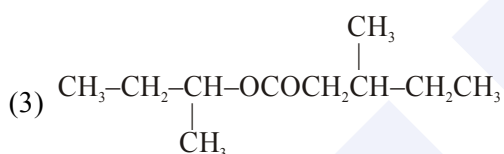
1. The complex that can show optical activity is:

- (1) $\text{trans-}[\text{Fe}(\text{NH}_3)_2(\text{CN})_4]^-$
- (2) $\text{cis-}[\text{Fe}(\text{NH}_3)_2(\text{CN})_4]^-$
- (3) $\text{cis-}[\text{CrCl}_2(\text{ox})_2]^{3-}$ (ox = oxalate)
- (4) $\text{trans-}[\text{Cr}(\text{Cl}_2)(\text{ox})_2]^{3-}$

Official Ans. by NTA (3)

2. An organic compound [A], molecular formula $\text{C}_{10}\text{H}_{20}\text{O}_2$ was hydrolyzed with dilute sulphuric acid to give a carboxylic acid [B] and alcohol [C]. Oxidation of [C] with $\text{CrO}_3 - \text{H}_2\text{SO}_4$ produced [B]. Which of the following structures are not possible for [A] ?

- (1) $(\text{CH}_3)_3\text{C}-\text{COOCH}_2\text{C}(\text{CH}_3)_3$
- (2) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$



Official Ans. by NTA (3)

Official Ans. by ALLEN (1 & 3)

3. If the boiling point of H_2O is 373 K, the boiling point of H_2S will be :

- (1) Greater than 300 K but less than 373 K
- (2) Less than 300 K
- (3) Equal to 373 K
- (4) More than 373 K

Official Ans. by NTA (2)

4. In a molecule of pyrophosphoric acid, the number of P–OH, P=O and P–O–P bonds/ moiety(ies) respectively are :

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

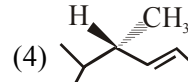
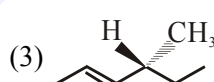
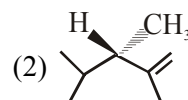
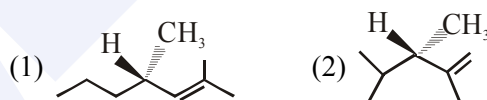
Official Ans. by NTA (4)

5. It is true that :

- (1) A zero order reaction is a single step reaction
- (2) A second order reaction is always a multistep reaction
- (3) A first order reaction is always a single step reaction
- (4) A zero order reaction is a multistep reaction

Official Ans. by NTA (4)

6. Which of the following compounds produces an optically inactive compound on hydrogenation ?



Official Ans. by NTA (2)

7. Henry's constant (in kbar) for four gases α , β , γ and δ in water at 298 K is given below :

	α	β	γ	δ
K_H	50	2	2×10^{-5}	0.5

(density of water = 10^3 kg m^{-3} at 298 K)

This table implies that :

- (1) The pressure of a 55.5 molal solution of γ is 1 bar
- (2) The pressure of a 55.5 molal solution of δ is 250 bar
- (3) Solubility of γ at 308 K is lower than at 298 K
- (4) α has the highest solubility in water at a given pressure

Official Ans. by NTA (2)

8. Tyndall effect of observed when :
- (1) The diameter of dispersed particles is much smaller than the wavelength of light used
 - (2) The diameter of dispersed particles is much larger than the wavelength of light used
 - (3) The diameter of dispersed particles is similar to the wavelength of light used
 - (4) The refractive index of dispersed phase is greater than that of the dispersion medium

Official Ans. by NTA (3)

9. Thermal power plants can lead to :
- (1) Ozone layer depletion
 - (2) Eutrophication
 - (3) Acid rain
 - (4) Blue baby syndrome

Official Ans. by NTA (3)

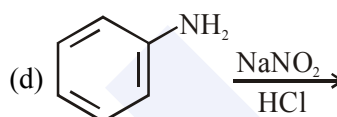
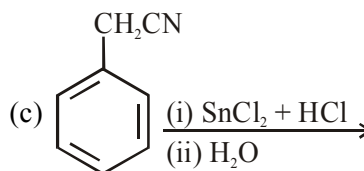
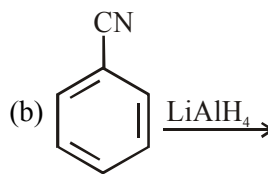
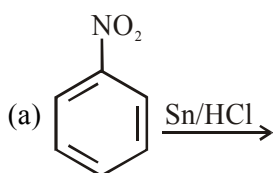
10. The electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ shows a single broad peak with a maximum at $20,300 \text{ cm}^{-1}$. The crystal field stabilization energy (CFSE) of the complex ion, in kJ mol^{-1} , is :
- (1) 242.5
 - (2) 83.7
 - (3) 145.5
 - (4) 97

Official Ans. by NTA (4)

11. Aqua regia is used for dissolving noble metals (Au, Pt, etc). The gas evolved in this process is :
- (1) N_2
 - (2) N_2O_3
 - (3) NO
 - (4) N_2O_5

Official Ans. by NTA (3)

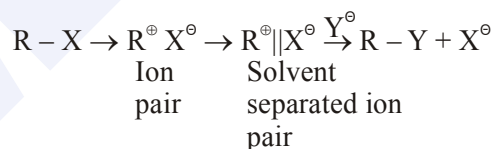
12. The Kjeldahl method of Nitrogen estimation fails for which of the following reaction products ?



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

Official Ans. by NTA (2)

13. The mechanism of $\text{S}_{\text{N}}1$ reaction is given as :



A student writes general characteristics based on the given mechanism as :

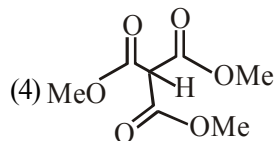
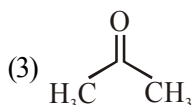
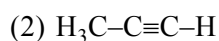
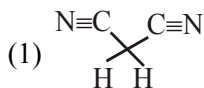
- (a) The reaction is favoured by weak nucleophiles
- (b) R^{\oplus} would be easily formed if the substituents are bulky
- (c) The reaction is accompanied by racemization
- (d) The reaction is favoured by non-polar solvents.

Which observations are correct ?

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

Official Ans. by NTA (2)

14. Which one of the following compounds possesses the most acidic hydrogen ?



Official Ans. by NTA (4)

15. Glycerol is separated in soap industries by :

- (1) Steam distillation
- (2) Differential extraction
- (3) Distillation under reduced pressure
- (4) Fractional distillation

Official Ans. by NTA (3)

16. Of the species, NO , NO^+ , NO^{2+} , NO^- , the one with minimum bond strength is :

- (1) NO^{2+} (2) NO^+ (3) NO (4) NO^-

Official Ans. by NTA (4)

17. The atomic number of the element unnilennium is :

- (1) 119 (2) 108 (3) 102 (4) 109

Official Ans. by NTA (4)

18. An acidic buffer is obtained on mixing :

- (1) 100 mL of 0.1 M CH_3COOH and 200 mL of 0.1 M NaOH
- (2) 100 mL of 0.1 M CH_3COOH and 100 mL of 0.1 M NaOH
- (3) 100 mL of 0.1 M HCl and 200 mL of 0.1 M CH_3COONa
- (4) 100 mL of 0.1 M HCl and 200 mL of 0.1 M NaCl

Official Ans. by NTA (3)

19. Let C_{NaCl} and C_{BaSO_4} be the conductances (in S) measured for saturated aqueous solutions of NaCl and BaSO_4 , respectively, at a temperature T. Which of the following is false ?

- (1) Ionic mobilities of ions from both salts increase with T

(2) $C_{\text{NaCl}} \gg C_{\text{BaSO}_4}$ at a given T

(3) $C_{\text{NaCl}}(T_2) > C_{\text{NaCl}}(T_1)$ for $T_2 > T_1$

(4) $C_{\text{BaSO}_4}(T_2) > C_{\text{BaSO}_4}(T_1)$ for $T_2 > T_1$

Official Ans. by NTA (3)

Official Ans. by ALLEN (Bonus)

20. The antifertility drug 'Novestrol' can react with :

- (1) Br_2/water ; ZnCl_2/HCl ; FeCl_3
- (2) Alcoholic HCN ; NaOCl ; ZnCl_2/HCl
- (3) Br_2/water ; ZnCl_2/HCl ; NaOCl
- (4) ZnCl_2/HCl ; FeCl_3 ; Alcoholic HCN

Official Ans. by NTA (1)

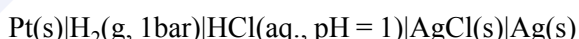
21. The volume strength of 8.9 M H_2O_2 solution calculated at 273 K and 1 atm is _____. ($R=0.0821$ L atm $\text{K}^{-1} \text{mol}^{-1}$) (rounded off to the nearest integer)

Official Ans. by NTA (100)

22. The mole fraction of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) in an aqueous binary solution is 0.1. The mass percentage of water in it, to the nearest integer, is _____.

Official Ans. by NTA (47)

23. The photoelectric current from Na (work function, $w_0 = 2.3$ eV) is stopped by the output voltage of the cell



The pH of aq. HCl required to stop the photoelectric current from K ($w_0 = 2.25\text{eV}$), all other conditions remaining the same, is _____ $\times 10^{-2}$ (to the nearest integer).

Given, $2.303 \frac{RT}{F} = 0.06\text{V}$; $E_{\text{AgCl}|\text{Ag}|\text{Cl}^-}^0 = 0.22\text{V}$

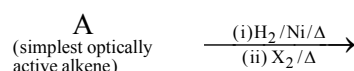
Official Ans. by NTA (58)

Official Ans. by ALLEN (142)

24. An element with molar mass $2.7 \times 10^{-2} \text{kgmol}^{-1}$ forms a cubic unit cell with edge length 405 pm. If its density is $2.7 \times 10^3 \text{kgm}^{-3}$, the radius of the element is approximately _____ $\times 10^{-12} \text{m}$ (to the nearest integer).

Official Ans. by NTA (143)

25. The total number of monohalogenated organic products in the following (including stereoisomers) reaction is _____.



Official Ans. by NTA (8)