



FINAL JEE–MAIN EXAMINATION – JULY, 2021

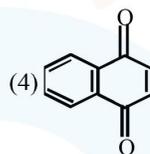
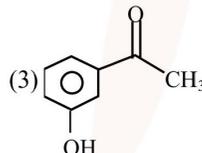
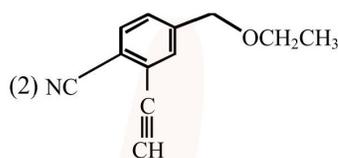
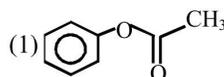
Held On Thursday 22nd July, 2021

TIME: 3:00 PM to 06:00 PM

SECTION-A

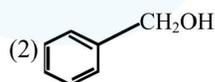
1. The water having more dissolved  $O_2$  is :  
 (1) boiling water           (2) water at  $80^\circ C$   
 (3) polluted water       (4) water at  $4^\circ C$   
**Official Ans. by NTA (4)**
2. Which one of the following statements for D.I. Mendeleeff, is **incorrect**?  
 (1) He authored the textbook – Principles of Chemistry.  
 (2) At the time, he proposed Periodic Table of elements structure of atom was known.  
 (3) Element with atomic number 101 is named after him.  
 (4) He invented accurate barometer.  
**Official Ans. by NTA (2)**
3. Which purification technique is used for high boiling organic liquid compound (decomposes near its boiling point)?  
 (1) Simple distillation  
 (2) Steam distillation  
 (3) Fractional distillation  
 (4) Reduced pressure distillation  
**Official Ans. by NTA (4)**

4. Which of the following compounds will provide a tertiary alcohol on reaction with excess of  $CH_3MgBr$  followed by hydrolysis?



**Official Ans. by NTA (1)**

5. Which of the following compounds does not exhibit resonance?



**Official Ans. by NTA (4)**



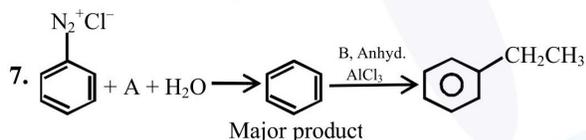
6. Match List-I with List-II

List-I (Elements)	List-II (Properties)
(a) Ba	(i) Organic solvent soluble compounds
(b) Ca	(ii) Outer electronic configuration $6s^2$
(c) Li	(iii) Oxalate insoluble in water
(d) Na	(iv) Formation of very strong monoacidic base

Choose the **correct** answer from the options given below :

- (1) (a)-(ii), (b)-(iii), (c)-(i) and (d)-(iv)
- (2) (a)-(iv), (b)-(i), (c)-(ii) and (d)-(iii)
- (3) (a)-(iii), (b)-(ii), (c)-(iv) and (d)-(i)
- (4) (a)-(i), (b)-(iv), (c)-(ii) and (d)-(iii)

**Official Ans. by NTA (1)**



In the chemical reactions given above A and B respectively are :

- (1)  $H_3PO_2$  and  $CH_3CH_2Cl$
- (2)  $CH_3CH_2OH$  and  $H_3PO_2$
- (3)  $H_3PO_2$  and  $CH_3CH_2OH$
- (4)  $CH_3CH_2Cl$  and  $H_3PO_2$

**Official Ans. by NTA (1)**

8. Isotope(s) of hydrogen which emits low energy  $\beta^-$  particles with  $t_{1/2}$  value  $> 12$  years is/are

- (1) Protium
- (2) Tritium
- (3) Deuterium
- (4) Deuterium and Tritium

**Official Ans. by NTA (2)**

9. Match List-I with List-II :

List-I (Species)	List-II (Hybrid Orbitals)
(a) $SF_4$	(i) $sp^3d^2$
(b) $IF_5$	(ii) $d^2sp^3$
(c) $NO_2^+$	(iii) $sp^3d$
(d) $NH_4^+$	(iv) $sp^3$
	(v) $sp$

Choose the **correct** answer from the options given below :

- (1) (a)-(i), (b)-(ii), (c)-(v) and (d)-(iii)
- (2) (a)-(ii), (b)-(i), (c)-(iv) and (d)-(v)
- (3) (a)-(iii), (b)-(i), (c)-(v) and (d)-(iv)
- (4) (a)-(iv), (b)-(iii), (c)-(ii) and (d)-(v)

**Official Ans. by NTA (3)**

10. When silver nitrate solution is added to potassium iodide solution then the sol produced is :

- (1)  $AgI / I^-$
- (2)  $AgI / Ag^+$
- (3)  $KI / NO_3^-$
- (4)  $AgNO_3 / NO_3^-$

**Official Ans. by NTA (1)**

11. Which of the following molecules does not show stereo isomerism ?

- (1) 3,4-Dimethylhex-3-ene
- (2) 3-Methylhex-1-ene
- (3) 3-Ethylhex-3-ene
- (4) 4-Methylhex-1-ene

**Official Ans. by NTA (3)**

12. Given below are the statements about diborane

- (a) Diborane is prepared by the oxidation of  $NaBH_4$  with  $I_2$
- (b) Each boron atom is in  $sp^2$  hybridized state
- (c) Diborane has one bridged 3 centre-2-electron bond
- (d) Diborane is a planar molecule

The option with **correct** statement(s) is -

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

**Official Ans. by NTA (2)**



13. Which one of the following group-15 hydride is the strongest reducing agent ?

- (1) AsH<sub>3</sub> (2) BiH<sub>3</sub> (3) PH<sub>3</sub> (4) SbH<sub>3</sub>

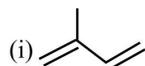
Official Ans. by NTA (2)

14. Match List-I with List-II :

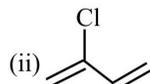
List-I

List-II

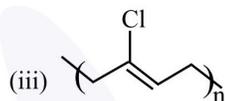
(a) Chloroprene



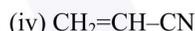
(b) Neoprene



(c) Acrylonitrile



(d) Isoprene



Choose the **correct** answer from the options given below :

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

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

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

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

Official Ans. by NTA (2)

15. The set having ions which are coloured and paramagnetic both is -

(1) Cu<sup>2+</sup>, Cr<sup>3+</sup>, Sc<sup>3+</sup>

(2) Cu<sup>2+</sup>, Zn<sup>2+</sup>, Mn<sup>4+</sup>

(3) Sc<sup>3+</sup>, V<sup>5+</sup>, Ti<sup>4+</sup>

(4) Ni<sup>2+</sup>, Mn<sup>7+</sup>, Hg<sup>2+</sup>

Official Ans. by NTA (1)

16. Thiamine and pyridoxine are also known respectively as :

(1) Vitamin B<sub>2</sub> and Vitamin E

(2) Vitamin E and Vitamin B<sub>2</sub>

(3) Vitamin B<sub>6</sub> and Vitamin B<sub>2</sub>

(4) Vitamin B<sub>1</sub> and Vitamin B<sub>6</sub>

Official Ans. by NTA (4)

17. Sulphide ion is soft base and its ores are common for metals.

(a) Pb

(b) Al

(c) Ag

(d) Mg

Choose the **correct** answer from the options given below :

(1) (a) and (c) only

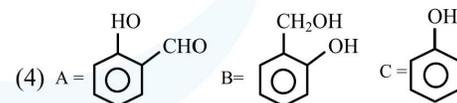
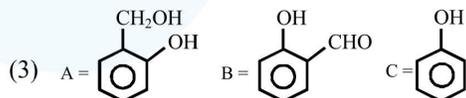
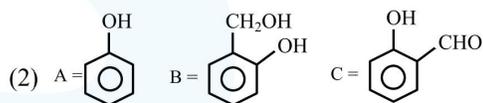
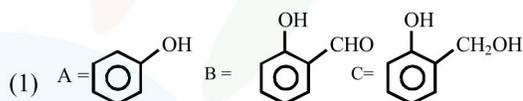
(2) (a) and (d) only

(3) (a) and (b) only

(4) (c) and (d) only

Official Ans. by NTA (1)

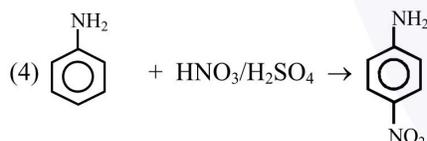
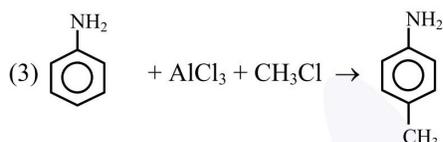
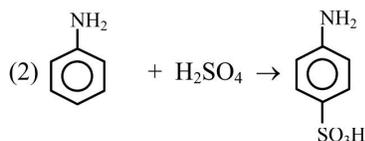
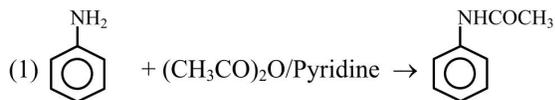
18. An organic compound A (C<sub>6</sub>H<sub>6</sub>O) gives dark green colouration with ferric chloride. On treatment with CHCl<sub>3</sub> and KOH, followed by acidification gives compound B. Compound B can also be obtained from compound C on reaction with pyridinium chlorochromate (PCC). Identify A, B and C .



Official Ans. by NTA (1)



19. Which one of the following reactions does not occur ?



**Official Ans. by NTA (3)**

20. Which one of the following 0.06 M aqueous solutions has lowest freezing point ?

- (1)  $\text{Al}_2(\text{SO}_4)_3$                       (2)  $\text{C}_6\text{H}_{12}\text{O}_6$   
 (3) KI                                      (4)  $\text{K}_2\text{SO}_4$

**Official Ans. by NTA (1)**

**SECTION-B**

1. The total number of unpaired electrons present in  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_2$  and  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$  is

**Official Ans. by NTA (1)**

**ALLEN Ans. (3)**

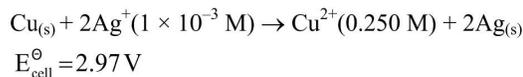
2. Methylation of 10 g of benzene gave 9.2 g of toluene. Calculate the percentage yield of toluene \_\_\_\_\_. (Nearest integer)

**Official Ans. by NTA (78)**

3. The number of acyclic structural isomers (including geometrical isomers) for pentene are \_\_\_\_

**Official Ans. by NTA (6)**

4. Assume a cell with the following reaction

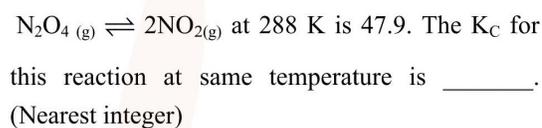


$E_{\text{cell}}$  for the above reaction is \_\_\_\_\_ V. (Nearest integer)

[Given :  $\log 2.5 = 0.3979$ ,  $T = 298 \text{ K}$ ]

**Official Ans. by NTA (3)**

5. Value of  $K_p$  for the equilibrium reaction



( $R = 0.083 \text{ L bar K}^{-1} \text{ mol}^{-1}$ )

**Official Ans. by NTA (2)**

6. If the standard molar enthalpy change for combustion of graphite powder is  $-2.48 \times 10^2 \text{ kJ mol}^{-1}$ , the amount of heat generated on combustion of 1 g of graphite powder is \_\_\_\_\_ kJ. (Nearest integer)

**Official Ans. by NTA (21)**

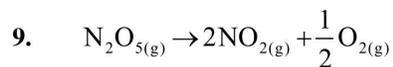
7. A copper complex crystallising in a CCP lattice with a cell edge of 0.4518 nm has been revealed by employing X-ray diffraction studies. The density of a copper complex is found to be  $7.62 \text{ g cm}^{-3}$ . The molar mass of copper complex is \_\_\_\_\_  $\text{g mol}^{-1}$ . (Nearest integer)

[Given :  $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$ ]

**Official Ans. by NTA (106)**

8. Number of electrons that Vanadium ( $Z = 23$ ) has in p-orbitals is equal to \_\_\_\_\_

**Official Ans. by NTA (12)**



In the above first order reaction the initial concentration of  $\text{N}_2\text{O}_5$  is  $2.40 \times 10^{-2} \text{ mol L}^{-1}$  at 318 K. The concentration of  $\text{N}_2\text{O}_5$  after 1 hour was  $1.60 \times 10^{-2} \text{ mol L}^{-1}$ . The rate constant of the reaction at 318 K is \_\_\_\_\_  $\times 10^{-3} \text{ min}^{-1}$ . (Nearest integer)

[Given :  $\log 3 = 0.477$ ,  $\log 5 = 0.699$ ]

**Official Ans. by NTA (7)**

10. If the concentration of glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) in blood is  $0.72 \text{ g L}^{-1}$ , the molarity of glucose in blood is \_\_\_\_\_  $\times 10^{-3} \text{ M}$ . (Nearest integer)

[Given : Atomic mass of C = 12, H = 1, O = 16 u]

**Official Ans. by NTA (4)**