

**FINAL JEE-MAIN EXAMINATION – SEPTEMBER, 2020**

**(Held On Thursday 03<sup>rd</sup> SEPTEMBER, 2020) TIME : 3 PM to 6 PM**

**CHEMISTRY**

1. Among the statements (I – IV), the correct ones are:

- (I) Be has smaller atomic radius compared to Mg.
- (II) Be has higher ionization enthalpy than Al.
- (III) Charge/radius ratio of Be is greater than that of Al.
- (IV) Both Be and Al form mainly covalent compounds.

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

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

2. The strengths of 5.6 volume hydrogen peroxide (of density 1 g/mL) in terms of mass percentage and molarity (M), respectively, are:

(Take molar mass of hydrogen peroxide as 34 g/mol)

- (1) 1.7 and 0.25                      (2) 1.7 and 0.5
- (3) 0.85 and 0.5                      (4) 0.85 and 0.25

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

3. Consider the hypothetical situation where the azimuthal quantum number,  $l$ , takes values 0, 1, 2, .....  $n + 1$ , where  $n$  is the principal quantum number. Then, the element with atomic number :

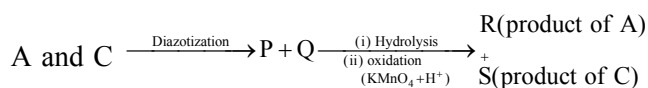
- (1) 13 has a half-filled valence subshell
- (2) 9 is the first alkali metal
- (3) 8 is the first noble gas
- (4) 6 has a 2p-valence subshell

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

**Official Ans. by ALLEN (2,3)**

**TEST PAPER WITH ANSWER**

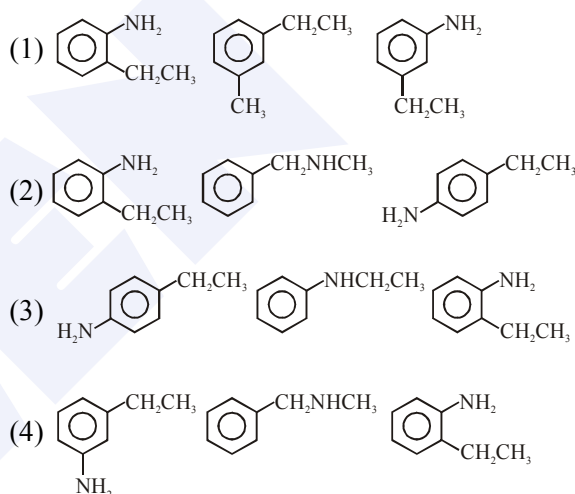
4. Three isomers A, B and C (mol. formula  $C_8H_{11}N$ ) give the following results :



R has lower boiling point than S

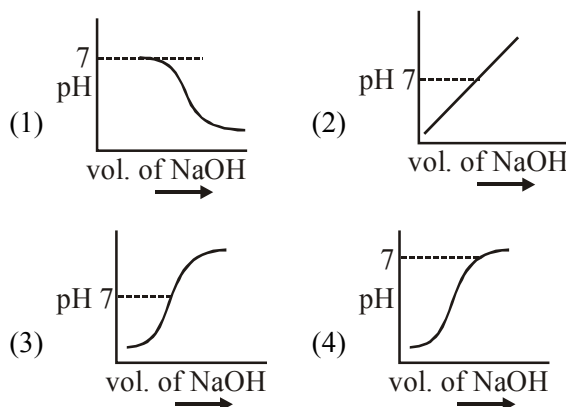
B  $\xrightarrow{C_6H_5SO_2Cl}$  alkali-insoluble product

A, B and C, respectively are :



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

5. 100 mL of 0.1 M HCl is taken in a beaker and to it 100 mL of 0.1 M NaOH is added in steps of 2 mL and the pH is continuously measured. Which of the following graphs correctly depicts the change in pH?



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

6. The incorrect statement(s) among (a) – (d) regarding acid rain is (are) :

- (a) It can corrode water pipes.
- (b) It can damage structures made up of stone.
- (c) It cannot cause respiratory ailments in animals.
- (d) It is not harmful for trees

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

Official Ans. by NTA (2)

7. The five successive ionization enthalpies of an element are 800, 2427, 3658, 25024 and 32824 kJ mol<sup>-1</sup>. The number of valence electrons in the element is :

- (1) 2
- (2) 3
- (3) 4
- (4) 5

Official Ans. by NTA (2)

8. A mixture of one mole each of H<sub>2</sub>, He and O<sub>2</sub> each are enclosed in a cylinder of volume V at temperature T. If the partial pressure of H<sub>2</sub> is 2 atm, the total pressure of the gases in the cylinder is :

- (1) 14 atm
- (2) 22 atm
- (3) 6 atm
- (4) 38 atm

Official Ans. by NTA (3)

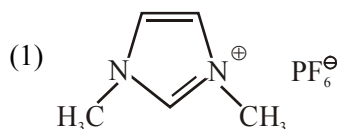
9. The d-electron configuration of [Ru(en)<sub>3</sub>]Cl<sub>2</sub> and [Fe(H<sub>2</sub>O)<sub>6</sub>]Cl<sub>2</sub>, respectively are :

- (1) t<sub>2g</sub><sup>4</sup> e<sub>g</sub><sup>2</sup> and t<sub>2g</sub><sup>6</sup> e<sub>g</sub><sup>0</sup>
- (2) t<sub>2g</sub><sup>6</sup> e<sub>g</sub><sup>0</sup> and t<sub>2g</sub><sup>6</sup> e<sub>g</sub><sup>0</sup>
- (3) t<sub>2g</sub><sup>6</sup> e<sub>g</sub><sup>0</sup> and t<sub>2g</sub><sup>4</sup> e<sub>g</sub><sup>2</sup>
- (4) t<sub>2g</sub><sup>4</sup> e<sub>g</sub><sup>2</sup> and t<sub>2g</sub><sup>4</sup> e<sub>g</sub><sup>2</sup>

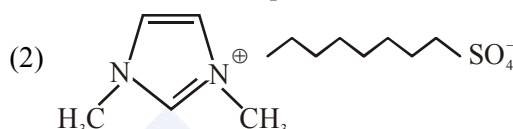
Official Ans. by NTA (3)

10. An ionic micelle is formed on the addition of :

excess water to liquid



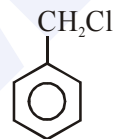
excess water to liquid



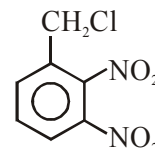
- (3) liquid diethyl ether to aqueous NaCl solution
- (4) sodium stearate to pure toluene

Official Ans. by NTA (2)

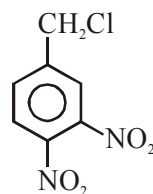
11. The decreasing order of reactivity of the following compounds towards nucleophilic substitution (S<sub>N</sub><sup>2</sup>) is :



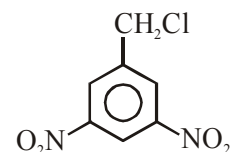
(I)



(II)



(III)

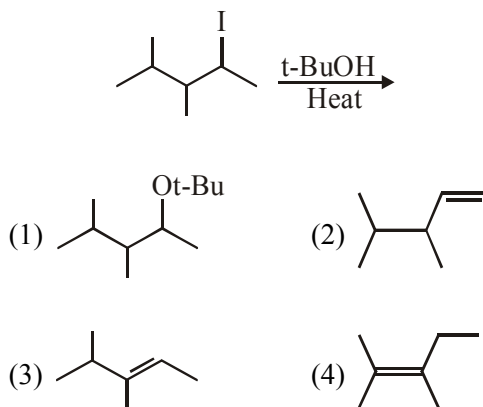


(IV)

- (1) (IV) > (II) > (III) > (I)
- (2) (II) > (III) > (IV) > (I)
- (3) (II) > (III) > (I) > (IV)
- (4) (III) > (II) > (IV) > (I)

Official Ans. by NTA (2)

12. The major product in the following reaction is :



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

13. The increasing order of the reactivity of the following compound in nucleophilic addition reaction is :

Propanal, Benzaldehyde, Propanone, Butanone

- (1) Butanone < Propanone < Benzaldehyde < Propanal  
 (2) Benzaldehyde < Butanone < Propanone < Propanal  
 (3) Propanal < Propanone < Butanone < Benzaldehyde  
 (4) Benzaldehyde < Propanal < Propanone < Butanone

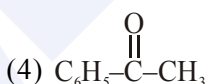
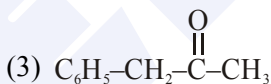
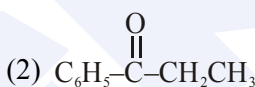
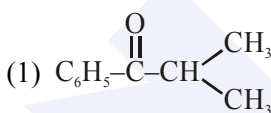
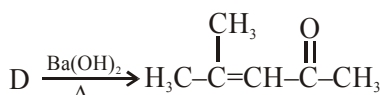
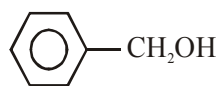
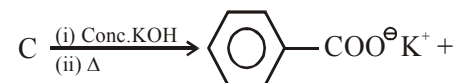
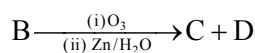
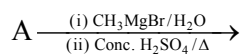
**Official Ans. by NTA (1)**

14. The incorrect statement is :

- (1) In manganate and permanganate ions, the  $\pi$ -bonding takes place by overlap of p-orbitals of oxygen and d-orbitals of manganese  
 (2) Manganate ion is green in colour and permanganate ion in purple in colour  
 (3) Manganate and permanganate ions are paramagnetic  
 (4) Manganate and permanganate ions are tetrahedral

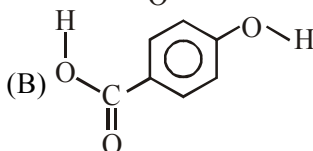
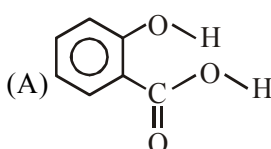
**Official Ans. by NTA (3)**

15. The compound A in the following reaction is :



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

16. Consider the following molecules and statements related to them :



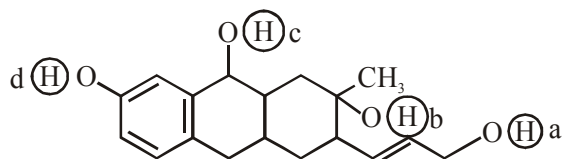
- (a) (B) is more likely to be crystalline than (A)  
 (b) (B) has higher boiling point than (A)  
 (c) (B) dissolves more readily than (A) in water  
 Identify the correct option from below :

- (1) only (a) is true      (2) (a) and (c) are true  
 (3) (b) and (c) are true      (4) (a) and (b) are true

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

**Official Ans. by ALLEN (2, 3 & 4)**

17. Consider the following reaction :



Chromic anhydride  $\rightarrow$  'P'

The product 'P' gives positive ceric ammonium nitrate test. This is because of the presence of which of these -OH group(s) ?

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

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

18. Match the following drugs with their therapeutic actions :

- |                                    |                    |
|------------------------------------|--------------------|
| (i) Ranitidine                     | (a) Antidepressant |
| (ii) Nardil<br>(Phenelzine)        | (b) Antibiotic     |
| (iii) Chloramphenicol              | (c) Antihistamine  |
| (iv) Dimetane<br>(Brompheniramine) | (d) Antacid        |
|                                    | (e) Analgesic      |

- (1) (i)-(a); (ii)-(c); (iii)-(b); (iv)-(e)
- (2) (i)-(e); (ii)-(a); (iii)-(c); (iv)-(d)
- (3) (i)-(d); (ii)-(a); (iii)-(b); (iv)-(c)
- (4) (i)-(d); (ii)-(c); (iii)-(a); (iv)-(e)

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

19. For the reaction  $2A + 3B + \frac{3}{2}C \rightarrow 3P$ , which statement is correct ?

- (1)  $\frac{dn_A}{dt} = \frac{dn_B}{dt} = \frac{dn_C}{dt}$
- (2)  $\frac{dn_A}{dt} = \frac{2}{3} \frac{dn_B}{dt} = \frac{3}{4} \frac{dn_C}{dt}$
- (3)  $\frac{dn_A}{dt} = \frac{3}{2} \frac{dn_B}{dt} = \frac{3}{4} \frac{dn_C}{dt}$
- (4)  $\frac{dn_A}{dt} = \frac{2}{3} \frac{dn_B}{dt} = \frac{4}{3} \frac{dn_C}{dt}$

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

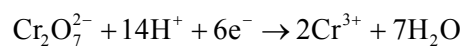
20. Complex A has a composition of  $H_{12}O_6Cl_3Cr$ . If the complex on treatment with conc.  $H_2SO_4$  loses 13.5% of its original mass, the correct molecular formula of A is :

[Given : atomic mass of Cr = 52 amu and Cl = 35 amu]

- (1)  $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$
- (2)  $[Cr(H_2O)_3Cl_3] \cdot 3H_2O$
- (3)  $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$
- (4)  $[Cr(H_2O)_6]Cl_3$

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

21. An acidic solution of dichromate is electrolyzed for 8 minutes using 2A current. As per the following equation



The amount of  $Cr^{3+}$  obtained was 0.104 g. The efficiency of the process(in%) is

(Take : F = 96000 C, At. mass of chromium = 52)

\_\_\_\_\_.

**Official Ans. by NTA (60)**

22.  $6.023 \times 10^{22}$  molecules are present in 10 g of a substance 'x'. The molarity of a solution containing 5 g of substance 'x' in 2 L solution is \_\_\_\_\_  $\times 10^{-3}$ .

**Official Ans. by NTA (25)**

23. The volume (in mL) of 0.1 N NaOH required to neutralise 10 mL of 0.1 N phosphinic acid is \_\_\_\_\_ .

**Official Ans. by NTA (10)**

24. If 250 cm<sup>3</sup> of an aqueous solution containing 0.73 g of a protein A is isotonic with one litre of another aqueous solution containing 1.65 g of a protein B, at 298 K, the ratio of the molecular masses of A and B is \_\_\_\_\_  $\times 10^{-2}$  (to the nearest integer).

**Official Ans. by NTA (177)**

25. The number of  $\text{>C=O}$  groups present in a tripeptide Asp – Glu – Lys is \_\_\_\_\_ .

**Official Ans. by NTA (5)**