



# FINAL JEE–MAIN EXAMINATION – SEPTEMBER, 2020

(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)**

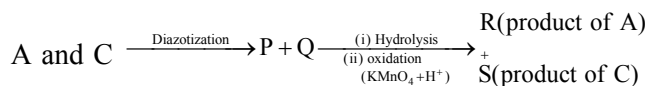
3. Consider the hypothetical situation where the azimuthal quantum number,  $l$ , takes values 0, 1, 2, .....  $n + 1$ , where  $n$  is the principal quantum number. Then, the element with atomic number :

- (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)**

## TEST PAPER WITH ANSWER

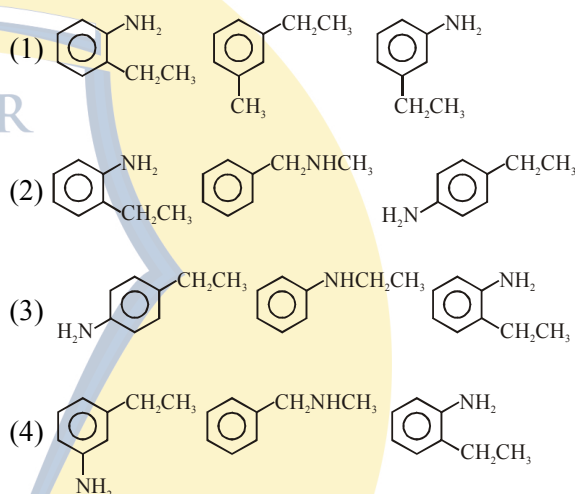
4. Three isomers A, B and C (mol. formula  $C_8H_{11}N$ ) give the following results :



R has lower boiling point than S

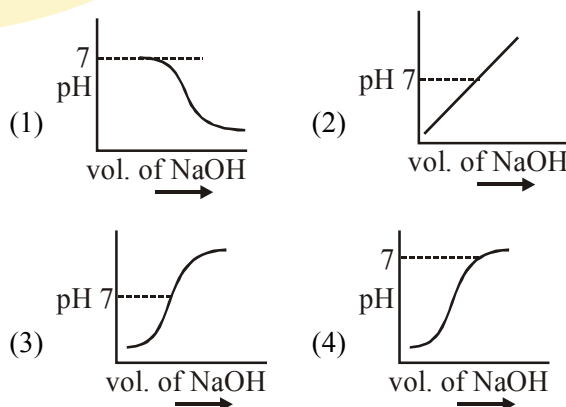
$B \xrightarrow{C_6H_5SO_2Cl}$  alkali-insoluble product

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)**

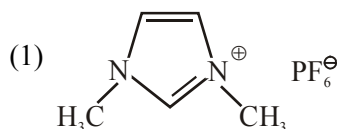
9. The d-electron configuration of [Ru(en)<sub>3</sub>]Cl<sub>2</sub> and [Fe(H<sub>2</sub>O)<sub>6</sub>]Cl<sub>2</sub>, respectively are :

- (1)  $t_{2g}^4 e_g^2$  and  $t_{2g}^6 e_g^0$   
 (2)  $t_{2g}^6 e_g^0$  and  $t_{2g}^6 e_g^0$   
 (3)  $t_{2g}^6 e_g^0$  and  $t_{2g}^4 e_g^2$   
 (4)  $t_{2g}^4 e_g^2$  and  $t_{2g}^4 e_g^2$

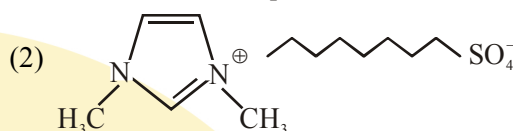
**Official Ans. by NTA (3)**

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

excess water to liquid



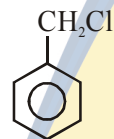
excess water to liquid



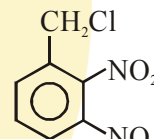
- (3) liquid diethyl ether to aqueous NaCl solution  
 (4) sodium stearate to pure toluene

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

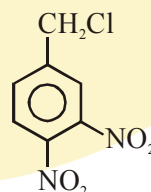
The decreasing order of reactivity of the following compounds towards nucleophilic substitution (S<sub>N</sub><sup>2</sup>) is :



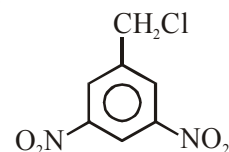
(I)



(II)



(III)

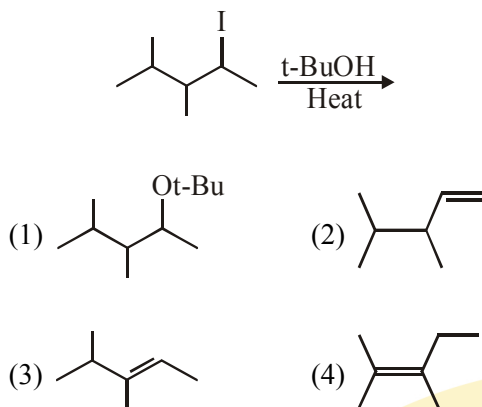


(IV)

- (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

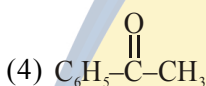
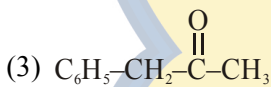
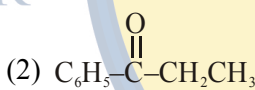
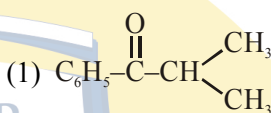
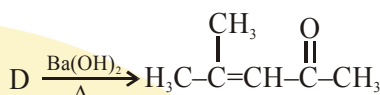
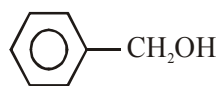
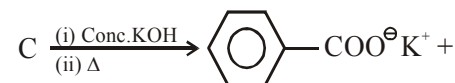
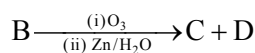
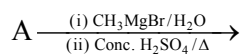
**Official Ans. by NTA (1)**

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

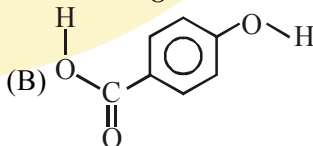
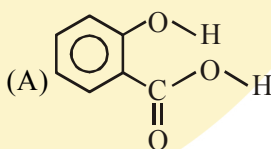
**Official Ans. by NTA (3)**

15. The compound A in the following reaction is :



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

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



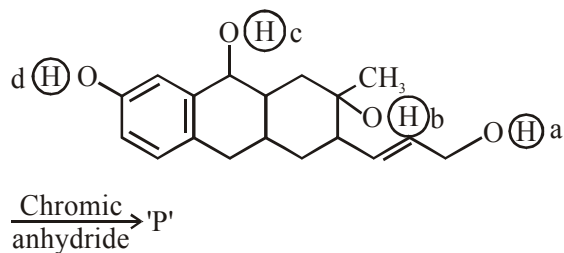
- (a) (B) is more likely to be crystalline than (A)
- (b) (B) has higher boiling point than (A)
- (c) (B) dissolves more readily than (A) in water

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)**

17. Consider the following reaction :



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)**

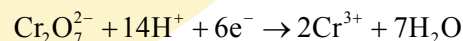
20. Complex A has a composition of  $H_{12}O_6Cl_3Cr$ . If the complex on treatment with conc.  $H_2SO_4$  loses 13.5% of its original mass, the correct molecular formula of A is :

[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  $250 \text{ cm}^3$  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)**

