

# RAMAKRISHNA MISSION VIDYAMANDIRA

Belur Math, Howrah – 711 202

ADMISSION TEST – 2019

CHEMISTRY (Honours)

Date : 19-06-2019

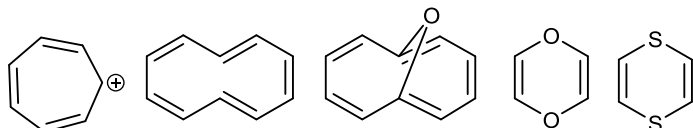
Full Marks : 50

Time: 11:00 a.m – 12:00 noon

## Instructions for the candidate

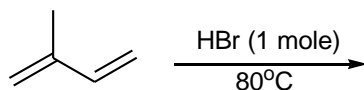
Answer all the questions given below. Each question carries **2 marks**. Tick (✓) the most appropriate option on the **OMR SHEET**. The tick must be very clear — if it is smudgy or not clear, no marks will be awarded. **Any rough work must be done in the supplied rough sheet(s).**

1. The total number of aromatic compounds present in the following series is:



- a) 2                      b) 3                      c) 4                      d) 5

2. In the following reaction the major product is -



- a)                      c)
- b)                      d)

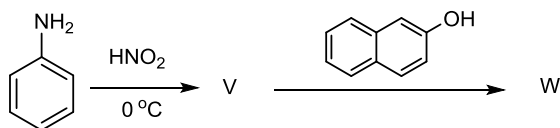
3. A compound with molecular formula  $C_6H_6O_2$  gave methane on treatment with excess  $MeMgBr$ . 5.5 g of the compound gave 2.24 litres of methane at STP. How many active hydrogens are present in the compound?

- a) 2                      b) 3                      c) 4                      d) 5

4. Which of the following compounds exhibits stereoisomerism?

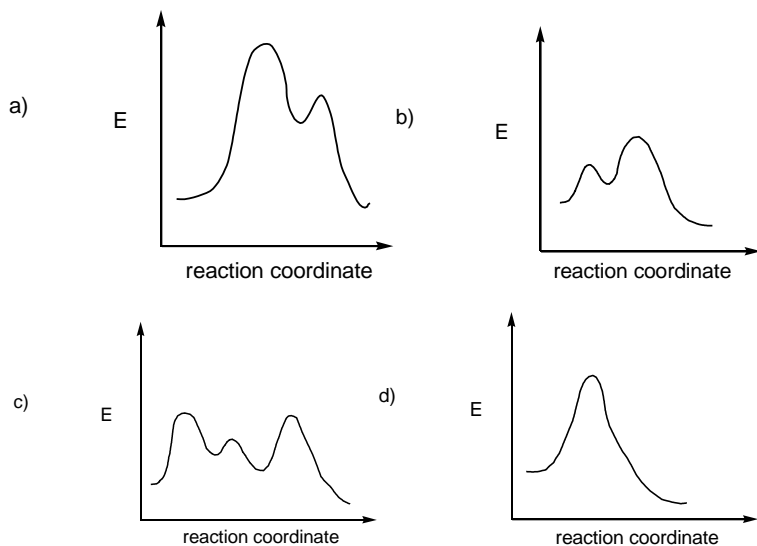
- a) 2-Methylbutene                      b) 3-Methylbutyne  
c) 3-Methylbutanoic acid                      d) 2-Methylbutanoic acid

5. In the following reactions the main product, W is -

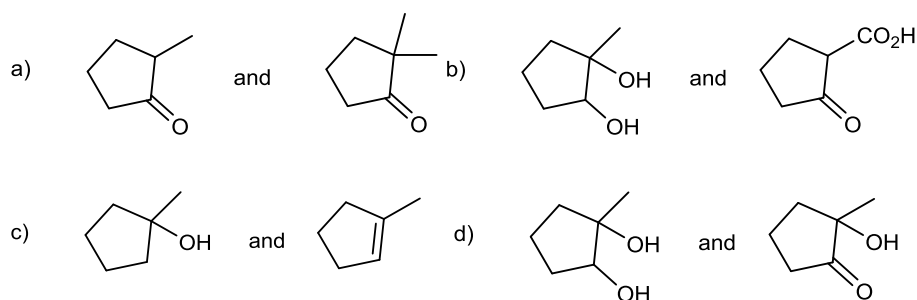
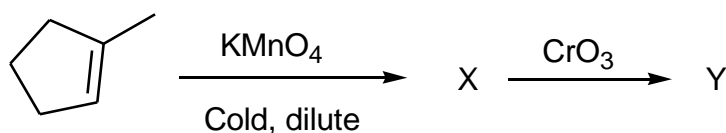


- a)                      b)
- c)                      d)

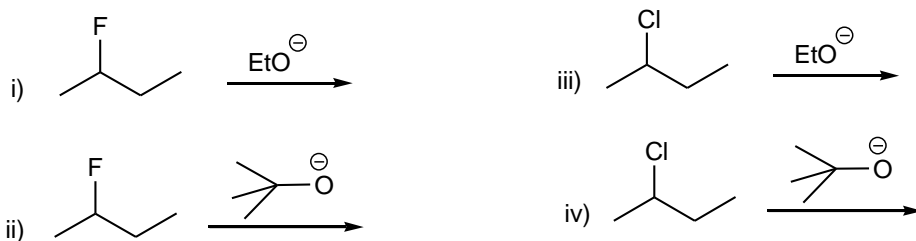
6. Which one is the correct energy profile diagram for the  $S_N1$  reaction?



7. Identify compound X and Y respectively in the following reactions:

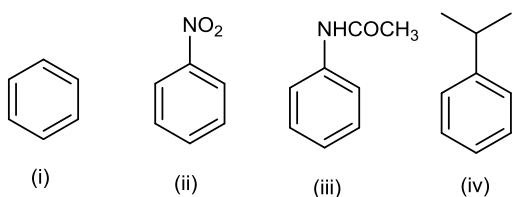


8. Which of the following would give Hofmann alkene as major product?



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

9. Consider the following compounds -



The correct order towards electrophilic substitution reaction is

- a) (iv) > (iii) > (ii) > (i)                      b) (i) > (ii) > (iii) > (iv)  
 c) (iv) > (iii) > (i) > (ii)                     d) (iii) > (iv) > (i) > (ii)

10. Amongst  $\text{Ni}(\text{CO})_4$ ,  $[\text{Ni}(\text{CN})_4]^{2-}$  and  $[\text{NiCl}_4]^{2-}$
- $[\text{Ni}(\text{CN})_4]^{2-}$  and  $\text{Ni}(\text{CO})_4$  are diamagnetic and  $[\text{NiCl}_4]^{2-}$  is paramagnetic
  - $[\text{NiCl}_4]^{2-}$  and  $\text{Ni}(\text{CO})_4$  are diamagnetic and  $[\text{Ni}(\text{CN})_4]^{2-}$  is paramagnetic
  - $\text{Ni}(\text{CO})_4$  is diamagnetic and  $[\text{Ni}(\text{CN})_4]^{2-}$  and  $[\text{NiCl}_4]^{2-}$  are paramagnetic
  - $[\text{NiCl}_4]^{2-}$  and  $\text{Ni}(\text{CO})_4$  are paramagnetic and  $[\text{Ni}(\text{CN})_4]^{2-}$  is diamagnetic
11. Standard electrode potential of  $\text{MnO}_4^-/\text{Mn}^{2+}$  is 1.51V. How much the oxidising power of the  $\text{MnO}_4^-/\text{Mn}^{2+}$  couple change if the  $\text{H}^+$  concentration is decreased 100 times?
- It will decrease by 0.189 V
  - It will increase by 0.019 V
  - It will decrease by 0.278 V
  - None of these
12. When boric acid is dissolved in oleum, it produces
- $[\text{B}(\text{HSO}_4)_4]^-$ ,  $\text{H}_3\text{SO}_4^+$  and  $\text{H}_2\text{O}$
  - $\text{SO}_2$ ,  $\text{B}_2\text{O}_3$  and  $\text{H}_2\text{O}$
  - $[\text{B}(\text{HSO}_4)_4]^-$ ,  $\text{SO}_3$ , and  $\text{B}_2\text{O}_3$
  - $\text{B}_2\text{H}_6$ ,  $\text{SO}_3$  and  $\text{H}_2\text{O}$
13. If  $\text{Li}_3\text{N}$  is added to liquid ammonia -
- The acidity of liquid ammonia is decreased
  - The basicity of liquid ammonia is decreased
  - $\text{N}_2$  is yielded
  - The acidity of liquid ammonia is increased
14. The equilibrium constant for the reaction at  $25^\circ\text{C}$
- $$\text{Zn (s)} + \text{Cu}^{2+} \rightleftharpoons \text{Zn}^{2+} + \text{Cu(s)}$$
- (Given: standard reduction potential of  $\text{Cu}^{2+}/\text{Cu} = 0.337 \text{ V}$  and  $\text{Zn}^{2+}/\text{Zn} = -0.763 \text{ V}$ ) is
- Nearly  $10^{37}$
  - Nearly  $10^{18.6}$
  - Nearly  $10^{74}$
  - Nearly  $10^7$
15. Out of  $\text{N}_2\text{O}$ ,  $\text{ClF}_2^-$ ,  $\text{SO}_2$  and  $\text{I}_3^-$ , the linear species are -
- $\text{N}_2\text{O}$  and  $\text{SO}_2$
  - $\text{ClF}_2^-$  and  $\text{I}_3^-$
  - $\text{SO}_2$  and  $\text{I}_3^-$
  - $\text{SO}_2$  and  $\text{ClF}_2^-$
16. For the preparation of sodium thiosulphate by Spring's reaction the reactants are -
- $\text{Na}_2\text{SO}_3$ ,  $\text{SO}_2$  and  $\text{I}_2$
  - $\text{Na}_2\text{SO}_3$ ,  $\text{Na}_2\text{S}$  and  $\text{I}_2$
  - $\text{Na}_2\text{SO}_3$ ,  $\text{Na}_2\text{S}$  and  $\text{Br}_2$
  - $\text{Na}_2\text{S}$ ,  $\text{SO}_2$  and  $\text{I}_2$
17. The potential difference through which an electron must be accelerated in order to raise the energy of a hydrogen atom from the ground state to the second excited state is -
- 20.4 eV
  - 12.09 eV
  - 15.11 eV
  - 10.2 eV

18. A hypothetical chemical reaction is given as:  $A + B \rightarrow C$  When the initial concentration of A is increased two fold (that of B remain fixed) the initial rate increases 4 fold, again when initial concentration of B increases 2 fold (that of A remain fixed) the initial rate increases 2 fold. What is the order of the reaction with respect to A and B?
- a) 2 and 2            b) 1 and 1            c) 2 and 1            d) 1 and 2
19. Calculate how much water you need to add to 10 ml of a 0.12 N NaOH solution to produce a 0.1 N NaOH solution.
- a) 12 ml            b) 1.2 ml            c) 2 ml            d) 1 ml
20. pH of a  $10^{-8}$  N acetic acid solution at  $25^\circ\text{C}$  is
- a) basic and greater than 7            b) basic and less than 7  
c) acidic and equal to 8            d) acidic and less than 7
21. The increasing order (lowest first) for the values of |charge|/mass ratio for electron (e), proton (p), neutron (n) and alpha particle ( $\alpha$ ) is
- a) e, p, n,  $\alpha$             b) n, p, e,  $\alpha$             c)  $\alpha$ , p, n, e            d) n,  $\alpha$ , p, e
22. Equal weights of ethane and hydrogen are mixed in an empty container at  $25^\circ\text{C}$ . The fraction of the total pressure exerted by hydrogen is -
- a) 1/2            b) 15/32            c) 15/16            d) 1/15
23. When  $\text{NaNO}_3$  is heated in a closed vessel, oxygen is liberated and  $\text{NaNO}_2$  is left behind
- $$\text{NaNO}_3 (\text{s}) \rightarrow \text{NaNO}_2 (\text{s}) + \frac{1}{2} \text{O}_2 (\text{g})$$
- At equilibrium,
- a) Addition of  $\text{NaNO}_3$  favours reverse reaction  
b) Addition of  $\text{NaNO}_2$  favours reverse reaction  
c) Increasing pressure favours forward reaction  
d) Increasing temperature favours forward reaction
24. Spontaneous adsorption of a gas on solid surface is an exothermic process because
- a) H increases for the system            b) S increases for the gas  
c) S decreases for the gas            d) G increases for the system
25. The gas X at 1 atm is bubbled through a solution containing a mixture of  $1\text{M Y}^-$  and  $1\text{M Z}^-$  at  $25^\circ\text{C}$ . If the order the reduction potential is  $Z > Y > X$ , then
- a) Y will oxidise X but not Z            b) Y will oxidise Z but not X  
c) Y will oxidise both X and Z            d) Y will reduce both X and Z

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