RAMAKRISHNA MISSION VIDYAMANDIRA

Belur Math, Howrah – 711 202

UG ADMISSION TEST – 2024

CHEMISTRY

Date :19-06-2024 **Full Marks : 50** Time: 11·00 a.m – 12·00 noon

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Instructions for the Candidate

Answer all the questions given below. Each question carries **2 marks**. No negative marking.

Tick (✓) the most appropriate option on the **ANSWER 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).

Candidates must return the rough sheet(s) along with the ANSWER SHEET.

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1. The orbital angular momentum (in units of $h/2\pi$) of the electron in the 3d orbital is-

   a) $6^{1/2}$ b) $2^{1/2}$ c) 2 d) 3

2. The compound which has four metal-metal bond is –

   a) $Fe_2(CO)_9$ b) $[Re_2Cl_8]^{2-}$ c) $Co_2(CO)_8$ d) $Ru_3(CO)_{12}$

3. The correct adduct formation order of Me_2S with Al-halides is-

   a) $AlI_3 > AlBr_3 > AlCl_3$ b) $AlBr_3 > AlCl_3 > AlI_3$

   c) $AlCl_3 > AlBr_3 > AlI_3$ d) $AlI_3 > AlCl_3 > AlBr_3$

4. The correct melting point order of the oxide of group 2 metal is-

   a) Bao > SrO> CaO> MgO> BeO b) BeO> MgO> CaO > SrO >BaO

   c) MgO >BeO> CaO> SrO> BaO d) MgO> CaO >BeO >SrO >BaO

5. The correct acidity order of the oxo-acid of phosphorus is-

   a) $H_3PO_2 > H_3PO_3 > H_3PO_4$ b) $H_3PO_4 > H_3PO_3 > H_3PO_2$

   c) $H_3PO_4 > H_3PO_2 > H_3PO_3$ d) none of these

6. The complex with maximum Crystal Field Stabilization Energy is-

   a) $[CoCl_4]^{2-}$ b) $[Co(H_2O)_6]^{3+}$ c) $CoF_3(H_2O)_3$ d) CoF_6^{3-}

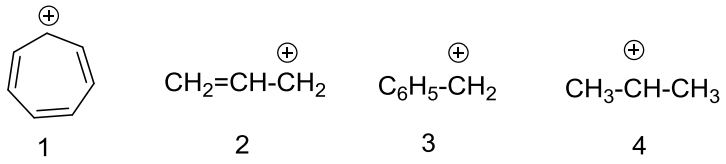
7. The number of moles of $KMnO_4$ required to oxidise one mole of $Fe(C_2O_4)$ in 1(M) H_2SO_4 medium is

   a) 0.2 b) 0.4 c) 0.6 d) 1.67

8. An unknown oxidising agent contains the element Y in +5 oxidation state. If it takes 26.98 ml of 0.1326(N) Na_2SO_3 to reduce 7.16×10^{-1} mole of $YO(OH)_2^+$ to lower state, the final oxidation state of Y is –

   a) -2 b) +2 c) +1 d) Zero

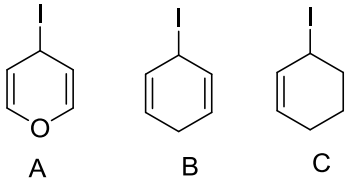
9. Decreasing order of stability of given carbocations is as :



1 2 3 4

a) 3>2>4>1 b) 1>3>4>2 c) 1>3>2>4 d) 3>2>1>4

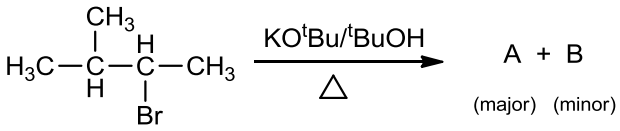
10. Compare the stability of carbocation which are formed when react with $AgNO_3$:



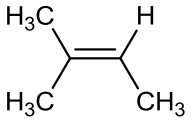
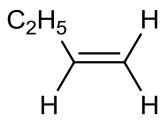
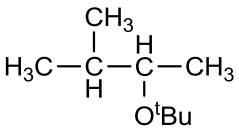
A B C

a) A>B>C b) A>C>B c) B>C>A d) B>A>C

11. Predict the structure of the product(s) in the following reaction:



The structure of A is:

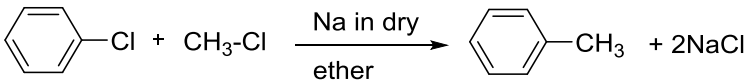
a)  b)  C) 

d) none of these above

12. The best reagent for the preparation of chloroalkane from an alcohol is :

a) $SOCl_2$ b) $HCl/ZnCl_2$ c) PCl_3 d) Cl_2/CCl_4

13. The following reaction known as :



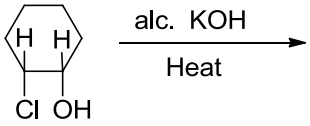
a) Wurtz reaction b) Wurtz – Fittig reaction

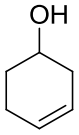
c) Fittig reaction d) Ullmann reaction

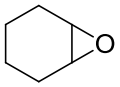
14. Phenol can be distinguished from ethyl alcohol by all reagents except:

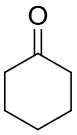
a) NaOH b) $FeCl_3$ c) Br_2/H_2O d) Na

15. Predict the correct product for the following reaction:



a) 

b) 

c) 

d) none

16. An organic compound "A" with molecular formula C_3H_6O which gives positive iodoform test. When reacted with dil NaOH solution gives "B" of molecular formula $C_9H_{14}O$. A and B respectively are :

a) Propanal and mesitylene
b) Propanone and mesityl oxide
c) Propanone and mesitylene oxide
d) Propanone and 2,6-dimethyl-2,5-heptadiene-4-one

17. Which of the following reactions could not be explained on the basis of open chain structure of D-glucose?

a) Pentaacetate of glucose does not react with NH_2OH
b) Glucose on prolong heating with HI gives n-hexane
c) Glucose with react with bromine water forms gluconic acid
d) With acetic anhydride glucose gives pentaacetate

18. Which of the following statement is TRUE?

a) Every process that has $\Delta T = 0$ is an isothermal process
b) $\Delta T = 0$ for every isothermal process
c) q must be zero for an isothermal process
d) ΔT must be zero for an adiabatic process

19. In which of the following process $\Delta U = 0$?

a) Reversible melting of solid benzene at 1 atm and the normal melting point
b) Reversible melting of ice at 1 atm and 0°C
c) Reversible adiabatic expansion of a perfect gas
d) Reversible isothermal expansion of a perfect gas

20. Real gases behave differently from ideal gas because:

a) the molecules of real gases are in constant motion
b) the molecules of real gases attract each other
c) the molecules of real gases collide with the walls of the container
d) of increase in the number of intermolecular collisions

21. 10 g of each of the following gases were taken HF, HCl, HBr and HI under same temperature and pressure, then which of the following statement is true

a) All of them have the same volume
b) HI will have the largest volume
c) HF will have the largest volume
d) None of the above

22. For a chemical reaction $3A \rightarrow 2B, \frac{d[B]}{dt}$ is equal to

a) $-\frac{1}{3}\frac{d[A]}{dt}$
b) $-\frac{2}{3}\frac{d[A]}{dt}$
c) $-\frac{3}{2}\frac{d[A]}{dt}$
d) $-\frac{1}{2}\frac{d[A]}{dt}$

23. Choose the correct option for the pH between 6 and 7 from the following solutions

10^{-6} N NaOH, 10^{-8} N CH_3COOH, 10^{-7} N HCl

a) Only NaOH solution
b) Only HCl solution
c) Both NaOH and HCl solution
d) Both CH_3COOH and HCl solution

24. Which of the following solutions has the highest specific conductance?

a) 0.01 (M) CH_3COOH
b) 0.01 (M) NH_4OH
c) 0.01 (M) KCl
d) 0.01 (M) K_2SO_4

25. EMF of the cell Fe^{3+} (aq) + H_2 (g) $\rightarrow 2H^+$ (aq) + Fe^{2+} (aq) is 0.77 V. E^0 of the reaction Fe^{2+} (aq) $\rightarrow$ Fe^{3+} (aq) + e is

a) + 0.77V
b) – 0.77V
c) + 1.54V
d) – 1.54V

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