

RAMAKRISHNA MISSION VIDYAMANDIRA

Belur Math, Howrah – 711 202

ADMISSION TEST – 2016

CHEMISTRY (Honours)

Date : 14-06-2016

Full Marks : 50

Time: 11:00 a.m – 12:30 p.m

Instructions for the candidate

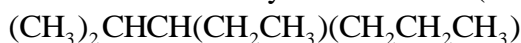
Answer all the questions given below. Each question carries 2 marks. Tick (✓) the correct option. The tick must be very clear — if it is smudgy or not clear, no marks will be awarded.

Name of the student : _____

Application No. : _____

Signature of the student : _____ Signature of the Invigilator : _____

1. What is the correct systematic name (IUPAC name) for the compound below?



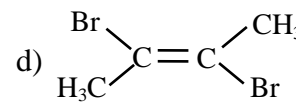
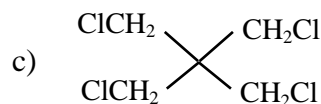
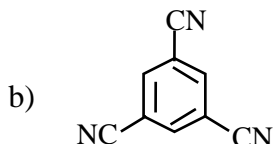
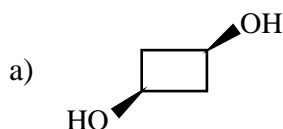
a) 3-Isopropylhexane

b) 2-Methyl-3-propylpentane

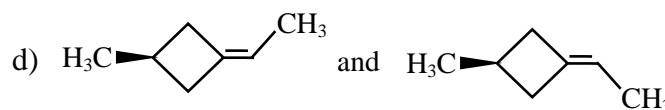
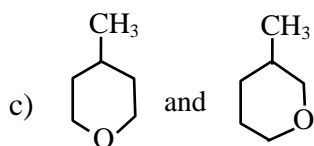
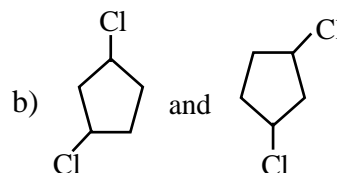
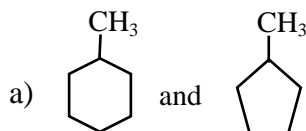
c) Ethyl isopropyl propyl methane

d) 3-Hexylpropane

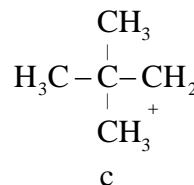
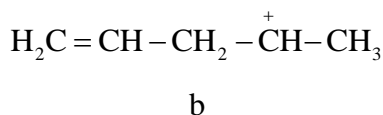
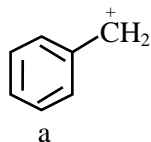
2. Which one of the following compounds has a dipole moment significantly different from zero?



3. Which of the following is a pair of structural isomers?



4. Which of the following five options is the correct order of relative stabilities of cations a, b and c as written below (most stable first)?



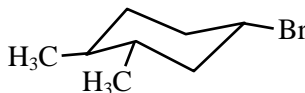
a) $a > b > c$

b) $b > c > a$

c) $c > a > b$

d) $a > c > b$

5. What is the correct stereochemical descriptor of the optically active compound drawn below?



a) 1R, 3R, 4S

b) 1R, 3S, 4R

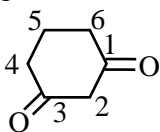
c) 1S, 3S, 4R

d) 1S, 3S, 4S

6. All the molecules drawn below are neutral compounds. Which one does not contain a formal positive charge and a formal negative charge?

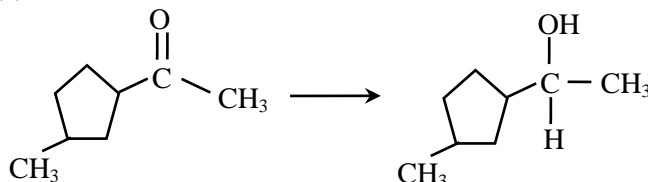
- a) $(\text{CH}_3)_3\text{N}-\text{B}(\text{CH}_3)_3$ b) $(\text{CH}_3)_2\text{N}-\text{O}-\text{CH}_3$ c) $\text{CH}_2 = \text{N} = \text{N}$ d) $(\text{CH}_3)_3\text{N}-\text{O}$

7. Which carbon has most acidic hydrogen?



- a) C₂ b) C₄ c) C₅ d) C₆

8. The appropriate reagent(s) for the transformation is/are



- a) Zn, Hg/HCl, 523 K b) $\text{NH}_2\text{NH}_2, \text{HO}^-$ c) NaBH_4 or LiAlH_4 d) All of these

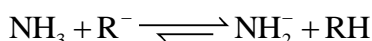
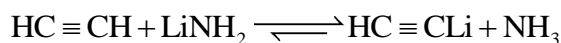
9. What is the correct order of reactivity of halides towards $\text{S}_{\text{N}}1$ reaction?

- a) $1^\circ > 2^\circ > 3^\circ$ b) $3^\circ > 2^\circ > 1^\circ$ c) $2^\circ > 3^\circ > 1^\circ$ d) $1^\circ > 3^\circ > 2^\circ$

10. When toluene is converted to *p*-aminobenzoic acid, the steps involved are in order

- a) Nitration, oxidation, reduction b) Oxidation, nitration, reduction
c) Nitration, reduction, oxidation d) Oxidation, reduction, nitration

11. From the following reactions



predict which of the following orders regarding base strength is correct?

- a) $\text{R}^- < \text{NH}_2^- < \text{HC} \equiv \text{C}^-$ b) $\text{R}^- > \text{NH}_2^- > \text{HC} \equiv \text{C}^-$ c) $\text{R}^- > \text{NH}_2^- < \text{HC} \equiv \text{C}^-$ d) $\text{R}^- < \text{NH}_2^- > \text{HC} \equiv \text{C}^-$

12. Phenol on exposure to air produces

- a) *p*-benzoquinone b) *o*-benzoquinone c) *o*- and *p*-benzoquinone d) Phenoquinone

13. For Cu^{2+} , Ni^{2+} , Cr^{3+} , Fe^{3+} ions, the correct order of no. of unpaired electron is—

- a) $\text{Fe}^{3+} > \text{Cr}^{3+} > \text{Ni}^{2+} > \text{Cu}^{2+}$ b) $\text{Cu}^{2+} > \text{Ni}^{2+} > \text{Cr}^{3+} > \text{Fe}^{3+}$
c) $\text{Cr}^{3+} > \text{Fe}^{3+} > \text{Cu}^{2+} > \text{Ni}^{2+}$ d) none of these

14. Which two is not identical in shape

- a) $\text{SiF}_4, \text{SF}_4$ b) $\text{PF}_6^-, \text{SF}_6$ c) $\text{IO}_3^-, \text{XeO}_3$ d) $\text{BH}_4^-, \text{NH}_4^+$

15. Which one contain O – O linkage

- a) $\text{H}_2\text{S}_2\text{O}_8$ b) $\text{H}_2\text{S}_2\text{O}_3$ c) $\text{H}_2\text{S}_2\text{O}_6$ d) $\text{H}_2\text{S}_4\text{O}_6$

16. The correct second ionisation energy of Ti, V, Cr and Mn is—

- a) $\text{Cr} > \text{Mn} > \text{V} > \text{Ti}$ b) $\text{Mn} > \text{Cr} > \text{V} > \text{Ti}$ c) $\text{Ti} > \text{V} > \text{Cr} > \text{Mn}$ d) none of these

17. Which of the following statements is true?

- a) Energy of the universe is a constant while entropy decreases with time
b) Free energy of the universe decreases while entropy increases with time
c) Energy of the universe is a constant while entropy increases with time
d) Both free energy and entropy of the universe increases with time

18. Consider the reaction $\text{A} + 2\text{B} \rightarrow \text{P}$ which of the following relations will be valid

- a) $\frac{d[\text{A}]}{dt} = \frac{d[\text{B}]}{dt}$ b) $\frac{d[\text{A}]}{dt} = 2 \frac{d[\text{B}]}{dt}$ c) $2 \frac{d[\text{A}]}{dt} = \frac{d[\text{B}]}{dt}$ d) $2 \frac{d[\text{A}]}{dt} = - \frac{d[\text{B}]}{dt}$

19. Which of the following hydrocarbons gives the maximum heat yield on complete combustion of 1 litre of the gas:
- a) propane b) methane c) acetylene d) ethylene
20. Consider the equilibrium
- $$A + B \rightleftharpoons C \text{ (all species gaseous)}$$
- which of the following statements is not true regarding this equilibrium
- a) The equilibrium constant is independent of pressure
 b) The equilibrium constant depends on temperature
 c) The equilibrium constant has the unit of pressure
 d) Introducing a catalyst does not have any effect on the equilibrium constant value
21. Which of the following hydrocarbons will be the best engine fuel?
- a) cyclooctane b) 2,2-dimethylhexane
 c) normal octane d) 2,2,4-trimethylpentane
22. Which of the following changes have no effect on the chemical equilibrium in the thermal decomposition of CaCO_3 ?
- a) temperature elevation b) pressure decrease
 c) addition of catalyst d) a change in the CO_2 concentration
23. The IUPAC name of the compound $[\text{Co}(\text{NH}_3)_6]\text{Cl}_2$ is
- a) cobalt (II) hexaammonia dichlorine b) cobalt (II) hexaammonia dichloride
 c) hexaamminecobalt (II) chloride d) hexaamminedichlorocobalt (II)
 e) cobalt (II) chloride-hexaammonia
24. Which of the following acid-base pairs is most suitable for keeping the pH constant at 9 in an aqueous solution?
- a) $\text{CH}_3\text{COOH}, \text{CH}_3\text{COO}^-$ b) $\text{NH}_4^+, \text{NH}_3$
 c) $\text{H}_2\text{CO}_3, \text{HCO}_3^-$ d) $\text{H}_2\text{PO}_4^-, \text{H}_3\text{PO}_4$
25. A solution with a volume of 1.00 dm^3 is saturated with lead iodide, PbI_2 . The concentration of iodide ions is 2.7 mol dm^{-3} . Determine the solubility product of PbI_2 .
- a) 3.6×10^{-6} b) 2.0×10^{-8} c) 9.8×10^{-9} d) 2.5×10^{-9}

FOR ROUGH WORK

