JEE MAIN-2010

CHEMISTRY

A. General Instructions :

1. This Question Paper contains 32 pages having 84 questions.
2. The question paper CODE is printed on the right hand top corner of this sheet and also on the back page (page no. 32) of this booklet
3. No additional sheets will be provided for rough work.
4. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are not allowed.
5. The answer sheet, a machine-gradable Objective Response Sheet (ORS), is provided separately.
6. Do not Tamper / mutilate the ORS or this booklet.
7. Do not break the seals of the question - paper booklet before instructed to do so by the invigilators.

B. Filling the bottom-half of the ORS:

8. The ORS has CODE printed on its lower and upper Parts.
9. Make sure the CODE on the ORS is die same as that on this booklet. If the Codes do not match, ask for a change of the Booklet.
10. Write your Registration No., Name and Name of centre and sign with pen in appropriate boxes. Do not write these any where else.
11. Darken the appropriate bubbles below your registration number with HB Pencil.

C. Question paper format and Marking scheme:

12. The question paper consists of 3 parts (Chemistry). Each part consists of four Sections.

13 For each question in Section I, you will be awarded 3 marks if you darken only the bubble corresponding to the correct answer and zero mark if no bubbles are darkened. In all other cases, minus one (-1) mark will be awarded.

14. For each question in Section II, you will be awarded 3 marks if you darken only the bubble corresponding to the correct answer and zero mark if no bubbles are darkened. Partial marks will be awarded for partially coned answers. No negative marks will be awarded in this Section.

15. For each question in Section III, you will be awarded 3 marks if you darken only the bubble corresponding to the correct answer and zero mark if no bubbles are darkened. In all other cases, minus one (—1) mark will be awarded.

16. For each question in Section IV, you will be awarded 3 marks if you darken the bubble corresponding to the correct answer and zero mark if no bubble is darkened. No negative marks will be awarded for in this Section

Useful Data

Atomic Numbers: Be 4; C 6; N 7; O 8; A1 13; Si 14; Cr24; Fe 26; Zn 30; Br 35.

1 amu	$= 1.66 \times 10^{-27}$ kg	R	$= 0.082$ L-atm K^{-1} mol^{-1}
h	$= 6.626 \times 10^{-34}$ J s	N_A	$= 6.022 \times 10^{23}$
m_e	$= 9.1 \times 10^{-31}$ kg	e	$= 1.6 \times 10^{-19}$ C
c	$= 3.0 \times 10^{8}$ m s^{-1}	F	$= 96500$ C $mo1^{-1}$
R_H	$= 2.18 \times 10^{-18}$ J	$4\pi \epsilon_0$	$= 1.11 \times 10^{-10}$ J^{-1} C^2 m^{-1}

SECTION I

This section contains **8 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of **which ONLY ONE** is correct.

1. The synthesis of $3-$ octyne is achieved by adding a bromoalkane into a mixture of sodium amide and an alkyne. The bromoalkane and alkyne respectively are

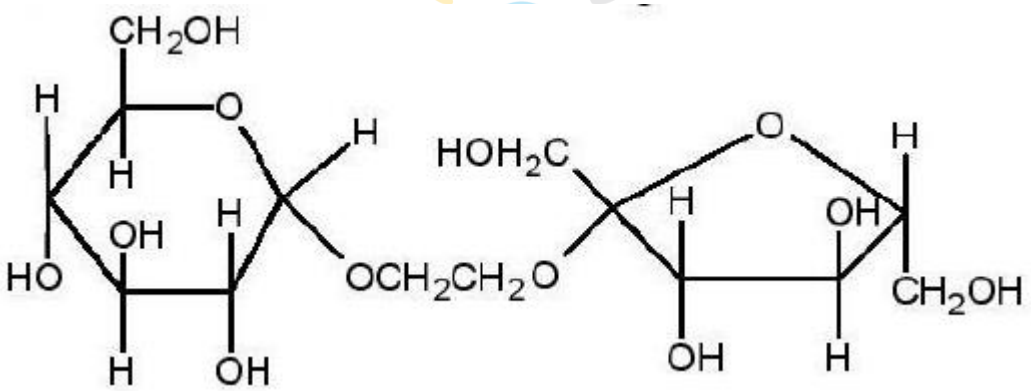
   A) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3CH_2C\equiv CH$

   B) $BrCH_2CH_2CH_3$ and $CH_3CH_2CH_2C\equiv CH$

   C) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3C\equiv CH$

   D) $BrCH_2CH_2CH_2CH_3$ and $CH_3CH_2C\equiv CH$

2. The correct statement about the following disaccharide is

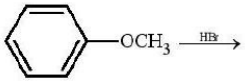


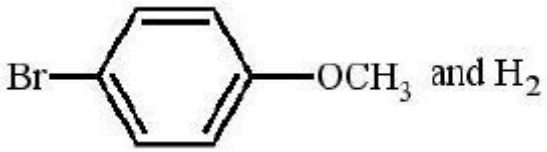
   A) Ring (a) is pyranonse with α- glycosidic link

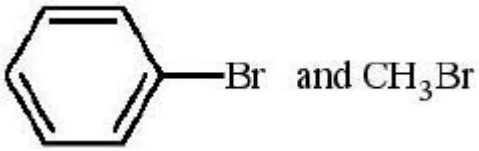
   B) Ring (a) is furanonse with α- glycosidic link

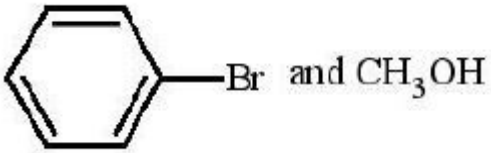
C) Ring (b) is furanonse with α- glycosidic link

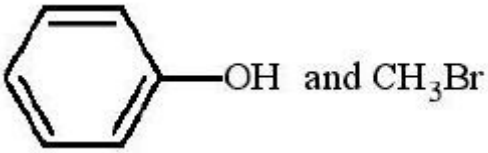
D) Ring (b) is pyranonse with β- glycosidic link

3. In the reaction  the products are

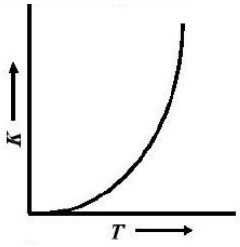
A) 

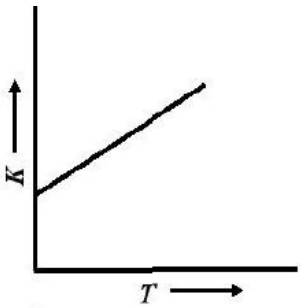
B) 

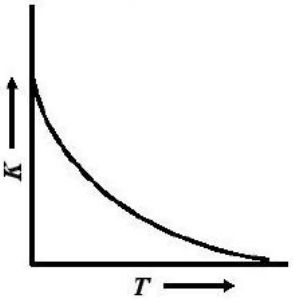
C) 

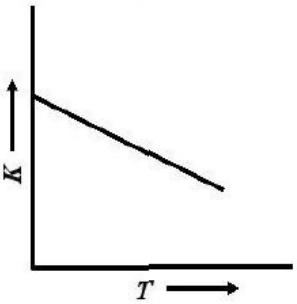
D) 

4. Plots showing the variation of the rate constant (k) with temperature (T) are given below. The plot that follows Arrhenius equation is

A) 

B) 

C) 

D) 

5. The species which by definition has ZERO standard molar enthalpy of formation at $298\,K$ is

A) $Br_2(g)$

B) $Cl_2(g)$

C) $H_2O(g)$

D) $CH_4(g)$

6. The bond energy (in $kcal\,mol^{-1}$) of a C–C single bond is approximately

A) 1

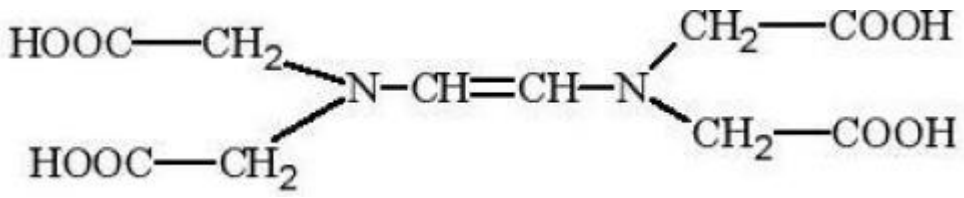
B) 10

C) 100

D) 1000

7. The correct structure of ethylenediaminetetra acetic acid (EDTA) is

A)



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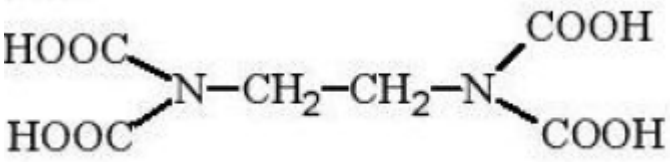
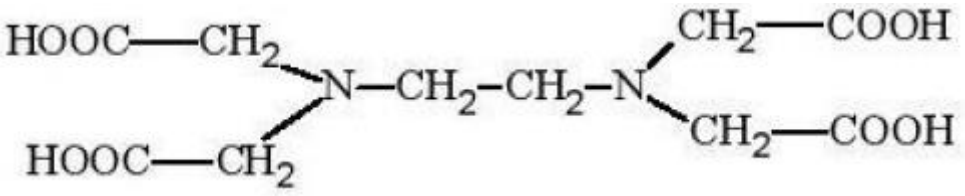
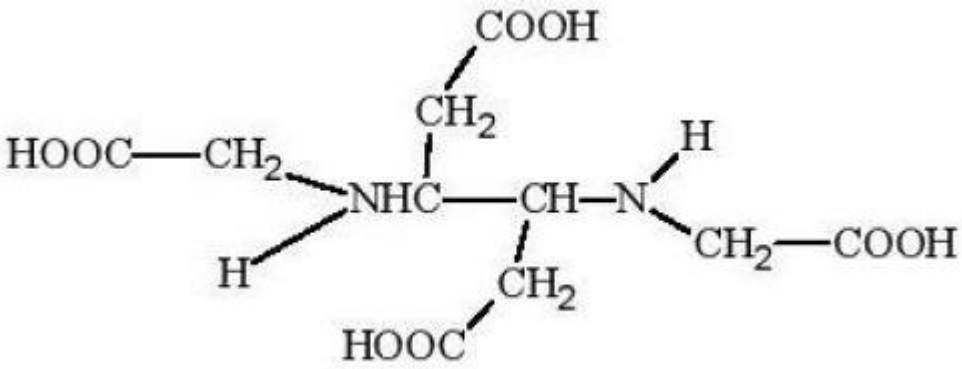


C)



D)



8. The ionization isomer of $\left[Cr(H_2O)_4Cl(NO_2)\right]Cl$ is

A) $\left[Cr(H_2O)_4(O_2N)\right]Cl_2$

B) $\left[Cr(H_2O)_4Cl_2\right](NO_2)$

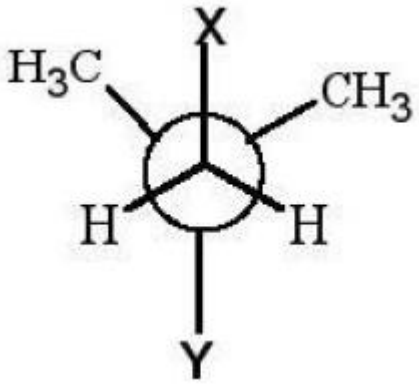
C) $\left[Cr(H_2O)_4Cl(ONO)\right]Cl$

D) $\left[Cr(H_2O)_4Cl_2(NO_2)\right]H_2O$

SECTION II

This section contains 5 multiple choice questions. Each question has four choices A), B), C) and D) out of which ONE OR MORE may be correct

9. In the Newman projection for 2, 2- dimethylbutane



X and *Y* can respectively be

A) H and H

B) H and C_2H_5

C) C_2H_5 and H

D) CH_3 and CH_3

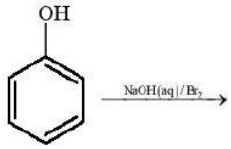
10. Aqueous solutions of HNO_3, KOH, CH_3COOH, and CH_3COONa of identical concentrations are provided. The pair (s) of solutions which form a buffer upon mixing is (are)

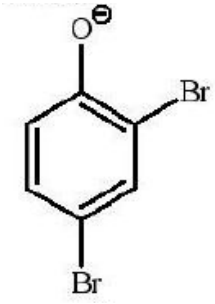
A) HNO_3 and CH_3COOH

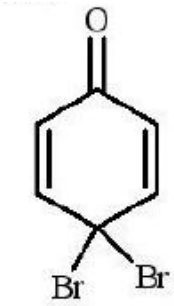
B) KOH and CH_3COONa

C) HNO_3 and CH_3COONa

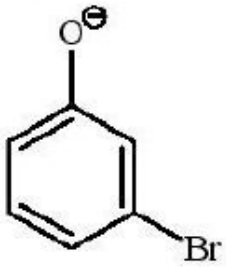
D) CH_3COOH and CH_3COONa

11. In the reaction  the intermediate(s) is(are)

A) 

B) 

C) 

D) 

12. The reagent(s) used for softening the temporary hardness of water is(are)

A) $Ca_3(PO_4)_2$

B) $Ca(OH)_2$

C) Na_2CO_3

D) NaOCl

13. Among the following, the intensive property is (properties are)

A) molar conductivity

B) electromotive force

C) resistance

D) heat capacity

SECTION III

This section contains 2 paragraphs. Based upon the first paragraphs 2 multiple choice questions and based upon the second paragraph 3 multiple choice questions have to be answered. Each of these questions has four choices A), B), C) and D) out of WHICH ONLY ONE CORRECT.

Paragraph for Question Nos. 14 to 15

The concentration of potassium ions inside a biological cell is at least twenty times higher than the outside. The resulting potential difference across the cell is important in several processes such as transmission of nerve impulses and maintaining the ion balance. A simple model for such a concentration cell involving a metal M is:

$$M(s)\left|M^+(aq;0.05\,\text{molar})\right|\left|M^+(aq),1\,\text{molar}\right|M(s)$$

For the above electrolytic cell the magnitude of the cell potential $|E_{cell}| = 70\text{mV}$.

14. For the above cell

A) $E_{cell} < 0; \Delta G > 0$

B) $E_{cell} > 0; \Delta G < 0$

C) $E_{cell} < 0; \Delta G^\circ > 0$

D) $E_{cell} > 0; \Delta G^\circ > 0$

15. If the 0.05 molar solution of M^+ is replaced by 0.0025 molar M^+ solution, then the magnitude of the potential would be

A) $35\,\text{mV}$

B) $70\,\text{mV}$

C) $140\,\text{mV}$

D) $700\,\text{mV}$

Paragraph for Question Nos. 16 to 18

Copper is the most noble of the first row transition metals and occurs in small deposits in several countries. Ores of copper include chalcanthite $\left(CuSO_4 \cdot 5H_2O\right)$, atacamite $\left(Cu_2Cl(OH)_3\right)$, cuprite $\left(Cu_2O\right)$, copper glance $\left(Cu_2S\right)$ and malachite $\left(Cu_2(OH)_2CO_3\right)$. However, 80% of the world copper production comes from the ore of chalcopyrite $\left(CuFeS_2\right)$. The extraction of copper from chalcopyrite involves partial roasting, removal of iron and self-reduction.

16. Partial roasting of chalcopyrite produces

A) Cu_2S and FeO

B) Cu_2O and FeO

C) CuS and Fe_2O_3

D) Cu_2O and Fe_2O_3

17. Iron is removed from chalcopyrite as

A) FeO

B) FeS

C) Fe_2O_3

D) $FeSiO_3$

18. In self-reduction, the reducing species is

A) S

B) O^{2-}

C) S^{2-}

D) SO_2

SECTION IV

This section contains TEN questions. The answer to each question is a single digit integer ranging from 0 to 9. The correct digit below the question number in the ORS is to be bubbled.

19. A student performs a titration with different burettes and finds title values of 25.2mL, 25.25mL and 25.0mL. The number of significant figures in the average title value is

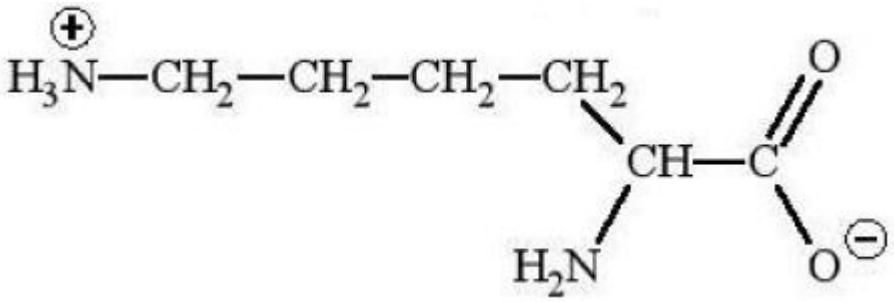
20. The concentration of R in the reaction $R \rightarrow P$ was measured as a function of time and the following data is obtained:

$[\text{R}]\ (\text{molar})$	1.0	0.75	0.40	0.10
$\text{t}\ (\text{min.})$	0.0	0.05	0.12	0.18

The order of the reaction is

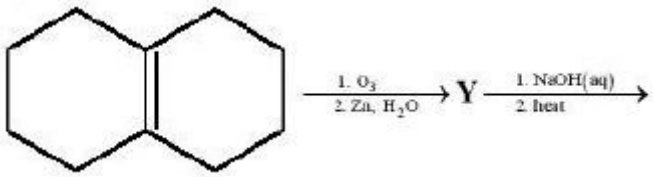
21. The number of neutrons emitted when $^{235}_{92}U$ undergoes controlled nuclear fission to $^{142}_{54}Xe$ and $^{90}_{38}Sr$ is

22. The total number of basic groups in the following form of lysine is

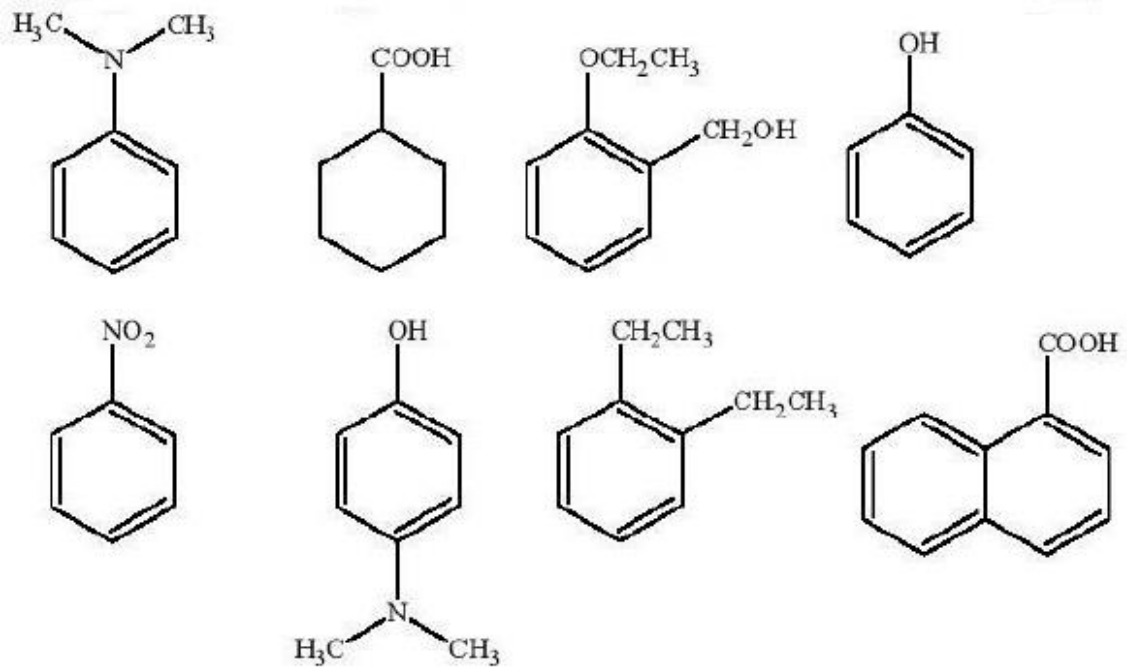


23. The total number of cyclic isomers possible for a hydrocarbon with the molecular formula C_4H_6 is

24. In the scheme given below, the total number of intra molecular aldol condensation products fonned from 'Y' is



25. Amongst the following, the total number of compound soluble in aqueous $NaOH$ is



26. Amongst the following, the total number of compounds whose aqueous solution turns red litmus paper blue is

$KCN \quad K_2SO_4 \quad (NH_4)_2C_2O_4 \quad NaCl \quad Zn(NO_3)_2 \quad FeCl_3 \quad K_2CO_3 \quad NH_4NO_3 \quad LiCN$

27. Based on VSEPR theory, the number of 90 degree F–Br–F angles in BrF_5 is

28. The value of n in the molecular formula $Be_nAl_2Si_6O_{18}$ is