JEE MAIN – 2020

CHEMISTRY
SECTION A

This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which Only One is correct.

26. The relative strength of interionic/ intermolecular forces in decreasing order is:

(1) ion-dipole $>$ dipole-dipole $>$ ion-ion

(2) dipole-dipole $>$ ion-dipole $>$ ion-ion

(3) ion-ion $>$ ion-dipole $>$ dipole-dipole

(4) ion-dipole $>$ ion-ion $>$ dipole-dipole

27. Oxidation number of potassium in K_2O, K_2O_2 and KO_2, respectively, is :

(1) $+2, +1 \& +\dfrac{1}{2}$

(2) $+1, +2 \& +4$

(3) $+1, +1 \& +1$

(4) $+1, +4 \& +2$

28. At $35\,^0C$, the vapour pressure of CS_2 is $512\,\text{mm Hg}$ and that of acetone is $344\,\text{mm Hg}$. A solution of CS_2 in acetone has a total vapour pressure of $600\,\text{mm Hg}$. The false statement amongst the following is:

(1) CS_2 and acetone are less attracted to each other than to themselves

(2) heat must be absorbed in order to produce the solution at $35\,^0C$.

(3) Raoult's law is not obeyed by this system

(4) A mixture of $100\,ml$ CS_2 and $100\,ml$ acetone has a volume $< 200\,ml$

29. The atomic radius of Ag is closest to:

(1) Ni

(2) Cu

(3) Au

(4) Hg

30. The dipole moments of $CCl_4, CHCl_3$ and CH_4 are in the order:

(1) $CH_4 < CCl_4 < CHCl_3$

(2) $CHCl_3 < CH_4 = CCl_4$

(3) $CH_4 = CCl_4 < CHCl_3$

(4) $CCl_4 < CH_4 < CHCl_3$

31. In comparison to the zeolite process for the removal of permanent hardness, the synthetic resins method is:

(1) Less efficient as it exchanges only anions

(2) More efficient as it can exchanges only cations

(3) Less efficient as the resins cannot be regenerated

(4) More efficient as it can exchange both cations as well as anions

32. Amongst the following statements, that which was not proposed by Dalton was:

(1) Matter consists of indivisible atoms

(2) When gases combine or reproduced in a chemical reaction, they do so in a simple ratio by volume provided all gases are at the same $T \& P$.

(3) Chemical reactions involve reorganisation of atoms. These are neither created nor destroyed in a chemical reaction.
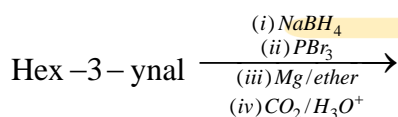
(4) All the atoms of a given element have identical properties including identical mass. Atoms of different elements differ in mass.
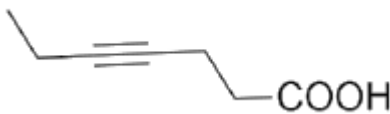
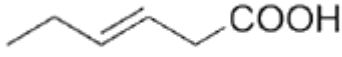**33.** The increasing order of pK_b for the following compounds will be:
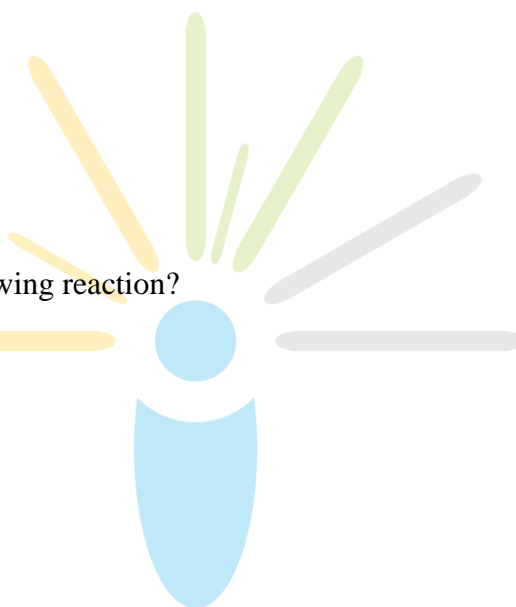
$H_2N-CH{=}NH$
(i)

(ii)

CH_3NHCH_3
(iii)
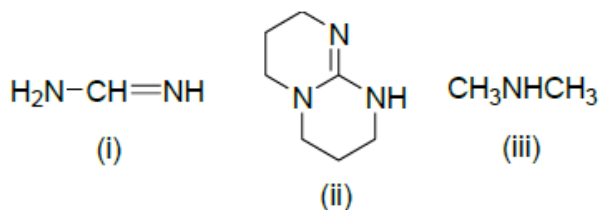
(1) $(ii) < (iii) < (i)$

(2) $(iii) < (i) < (ii)$

(3) $(i) < (ii) < (iii)$

(4) $(ii) < (i) < (iii)$

34. What is the product of the following reaction?

$$\text{Hex} -3-\text{ynal} \xrightarrow[\substack{(iii)\,Mg/ether \\ (iv)\,CO_2/H_3O^+}]{\substack{(i)\,NaBH_4 \\ (ii)\,PBr_3}}$$

(1) COOH

(2) COOH

(3) COOH

(4) COOH

35. The number of orbitals associated with quantum number $n = 5, m_s = +\dfrac{1}{2}$ is:

(1) 11

(2) 15

(3) 25

(4) 50

36. The purest form of commercial iron is:

(1) Cast iron

(2) Wrought iron

(3) Scrap iron and pig iron

(4) Pig iron

37. The theory that can completely/ properly explain the nature of bonding in $[Ni(CO)_4]$

is:

(1) Werner's theory

(2) Crystal Field Theory

(3) Molecular Orbital Theory

(4) Valence Bond Theory

38. The IUPAC name of the complex $[Pt(NH_3)_2Cl(NH_2CH_3]Cl$ is :

(1) Diamminechlorido(methanamine)platinum(II) chloride

(2) Bisammine(methanamine)chloridoplatinum(II) chloride

(3) Diammine(methanamine)chloridoplatinum(II) chloride

(4) Diamminechlorido(aminomethane)platinum(II) chloride

39. 1– methyl ethylene oxide when treated with an excess of *HBr* produces:

(1)

(2)

(3)

(4)
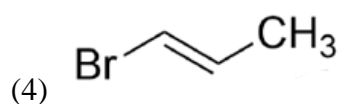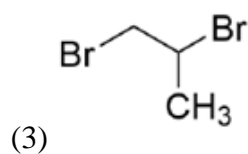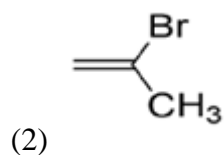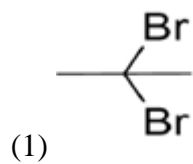
40. Consider the following reaction:
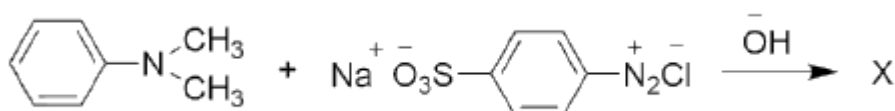
The product ' *X* ' is used:

(1) In protein estimation as an alternative to ninhydrin

(2) As food grade colourant

(3) In laboratory test for phenols

(4) In acid-base titration as an indicator

41. Match the following:

	List I		List II
(i)	Riboflavin	(p)	Beri beri
(ii)	Thiamine	(q)	Scurvy
(iii)	Ascorbic acid	(r)	Cheliosis
(iv)	Pyridoxine	(s)	Convulsions

(1)

(i)	(ii)	(iii)	(iv)
(s)	(p)	(q)	(r)

(2)

(i)	(ii)	(iii)	(iv)
(r)	(p)	(q)	(s)

(3)

(i)	(ii)	(iii)	(iv)
(p)	(r)	(q)	(s)

(4)

(i)	(ii)	(iii)	(iv)
(s)	(r)	(q)	(p)

42. Given that the standard potential; (E^0) of Cu^{2+}/Cu and Cu^+/Cu are $0.34\,V$ and $0.522\,V$ respectively, the E^0 of Cu^{2+}/Cu^+ is:

(1) $+0.158\,V$
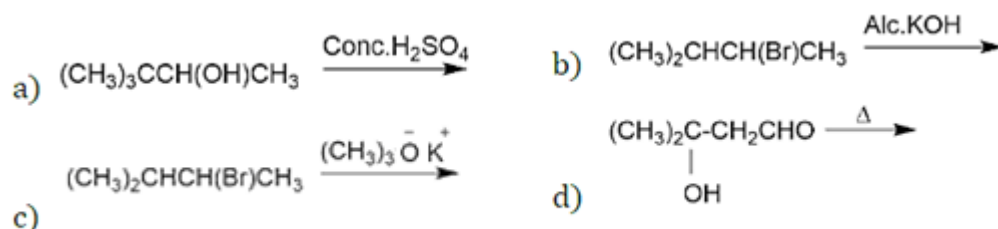
(2) $-0.158\,V$

(3) $+0.182\,V$

(4) $-0.182\,V$

43. A solution of $m-$chloroaniline, $m-$chlorophenol and $m-$chlorobenzoic acid in ethyl acetate was extracted initially with a saturated solution of $NaHCO_3$ to give fraction A. The left over organic phase was extracted with dil. $NaOH$ solution to give fraction B. The final organic layer was labelled as fraction C. Fractions A, B and C, contain respectively:

(1) $m-$chlorobenzoic acid, $m-$chlorophenol and $m-$chloroaniline

(2) $m-$chlorophenol, $m-$chlorobenzoic acid and $m-$chloroaniline

(3) $m-$chloroaniline, $m-$chlorobenzoic acid and $m-$chlorophenol

(4) $m-$chlorobenzoic acid, $m-$chloroaniline and $m-$chlorophenol

44. The electron gain enthalpy (in $kJ\,mol^{-1}$) of fluorine, chlorine, bromine, and iodine, respectively, are:

(1) $-333, -325, -349$ and -296

(2) $-333, -349, -325$ and -296

(3) $-296, -325, -333$ and -349

(4) $-349, -333, -325$ and -296

45. Consider the following reactions:

a) $(CH_3)_3CCH(OH)CH_3 \xrightarrow{\text{Conc.}H_2SO_4}$

b) $(CH_3)_2CHCH(Br)CH_3 \xrightarrow{\text{Alc.KOH}}$

c) $(CH_3)_2CHCH(Br)CH_3 \xrightarrow{(CH_3)_3\overset{-}{O}\overset{+}{K}}$

d) $(CH_3)_2\overset{\displaystyle C}{\underset{\displaystyle OH}{C}}-CH_2CHO \xrightarrow{\Delta}$

Which of these reaction(s) will not produce Saytzeff product?

(1) (b) and (d)

(2) (d) only

(3) (a), (c) and (d)

(4) (c) only

SECTION B

This section contains 5 Numerical value type questions.

46. Two solutions A and B each of $100\,L$ was made by dissolving $4\,g$ of $NaOH$ and $9.8\,g$ of H_2SO_4 in water, respectively. The pH of the resulting solution obtained from mixing $40\,L$ of solution A and $10\,L$ of Solution B is:

47. During the nuclear explosion, one of the products is $_{90}Sr$ with half of 6.93 years. If $1\,\mu g$ of $_{90}Sr$ was absorbed in the bones of a newly born baby in place of Ca, how much time, in years, is required to reduce it by 90% if it is not lost metabolically.

48. Chlorine reacts with hot and concentrated $NaOH$ and produces compounds (X) and (Y). Compound (X) gives white precipitate with silver nitrate solution. The average bond order between Cl and O atoms in (Y) is

49. The number of chiral carbons in chloramphenicol is:

50. For the reaction $A(l) \rightarrow 2B(g)$

$\Delta U = 2.1\,\text{kcal}, \Delta S = 20\,\text{cal K}^{-1}$ at $300\,K$, Hence $\left|\Delta G\right|$ in kcal is