Resonance®
Educating for better tomorrow

PAPER-1 (B.E./B. TECH.)

JEE (Main) 2020

COMPUTER BASED TEST (CBT)

Questions & Solutions

Date: 04 September, 2020 (SHIFT-1) | TIME : (9.00 a.m. to 12.00 p.m)

Duration: 3 Hours | Max. Marks: 300

SUBJECT : CHEMISTRY

Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | **FAX No. :** +91-022-39167222

To Know more : sms **RESO** at **56677** | **Website :** www.resonance.ac.in | **E-mail :** contact@resonance.ac.in | **CIN :** U80302RJ2007PLC024029

Toll Free : 1800 258 5555 **7340010333** facebook.com/ResonanceEdu twitter.com/ResonanceEdu www.youtube.com/resowatch blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2020 Solution portal

Resonance®
Educating for better tomorrow

Many Dreamers... Many Achievers...

It's your turn now!

ADMISSION OPEN (2020-21)

For Classroom Programs*

TARGET
JEE (Main+Advanced) 2021
COURSE
VIJAY

TARGET
JEE (Main) 2021
COURSE
AJAY

Digital Program

TARGET
JEE (Main+Advanced) 2021
COURSE
iVISHESH

Scholarship upto 90% on JEE (Main) 2020 %ile Score

Digital Learning

For Class 7th to 12th+

Salient features

- Live Interactive Classes & Recorded Lectures
- Online Study Material & DPPs (Daily Practice Problems)
- Discussion & Doubt Clearing Classes (Every week for each subject)
- CBT - Computer Based Test & Performance Analysis
- Discussion Forum for Doubt Clearing & Additional Learning

*Presently classes would be offered Online and Offline classes would resume as per Government Guidelines.

Toll Free: 1800 258 5555 | Visit us: www.resonance.ac.in

PART : CHEMISTRY

SECTION – 1 : (Maximum Marks : 80)

Straight Objective Type (सीधे वस्तुनिष्ठ प्रकार)

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.

इस खण्ड में **20 बहु–विकल्पी प्रश्न** हैं। प्रत्येक प्रश्न के 4 विकल्प (1), (2), (3) तथा (4) हैं, जिनमें से **सिर्फ एक सही** है।

1. The elements with atomic numbers 101 and 104 belong to, respectively :

(1) Actinoids and Group 4 (2) Group 11 and Group 4

(3) Group 6 and Actinoids (4) Actinoids and Group 6

Ans. **(1)**

Sol. $_{89}Ac \longrightarrow {}_{103}Lr$

Belongs to actinoids series and they all belongs to 3rd group. So atomic no. 101 element is actinoids and atomic number 104 element belongs to 4th group.

2. The ionic radii of O^{2-}, F^-, Na^+ and Mg^{2+} are in the order :

(1) $O^{2-} > F^- > Na^+ > Mg^{2+}$ (2) $F^- > O^{2-} > Na^+ > Mg^{2+}$

(3) $O^{2-} > F^- > Mg^{2+} > Na^+$ (4) $Mg^{2+} > Na^+ > F^- > O^{2-}$

Ans. **(1)**

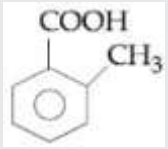
Sol.

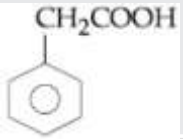
	O^{2-}	F^-	Na^+	Mg^{2+}
Z	8	9	11	12
No. of e^-	10	10	10	10

In isoelectronic species greater is Z smaller is radius so order is $O^{2-} > F^- > Na^+ > Mg^{2+}$.

3. [P] on treatment with $Br_2/FeBr_3$ in CCl_4 produced a single isomer $C_8H_7O_2Br$ wile heating [P] with sodalime gas toluene. The compound [P] is :

(1)

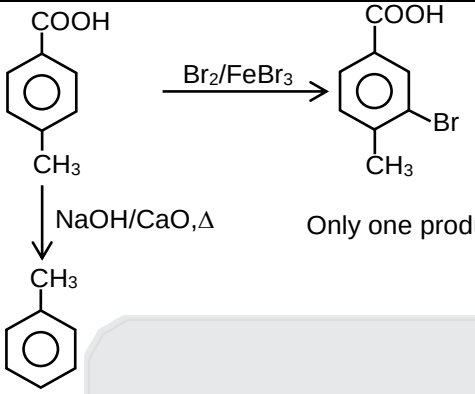
(2) 

(3) 

(4)

Ans. **(1)**

Sol.



Only one product

4. For one mole of an ideal gas, which of these statements must be true ?

(a) U and H each depends only on temperature

(b) Compressibility factor z is not equal to 1

(c) $C_{P,m} - C_{V,m} = R$

(d) $dU = C_V dT$ for any process

(1) (b), (c) and (d) (2) (a) and (c) (3) (a), (c) and (d) (4) (c) and (d)

Ans. **(3)**

Sol. (a) For ideal gas U and H are function of Temprature $U = \frac{f}{2}nRT$

(c) $C_P - C_V = R$

(d) $\Delta U = C_V dT$ for all processes

5. Among statements (a) – (d), the correct ones are :

(a) Lime stone is decomposed to CaO during the extraction of iron from its oxides.

(b) In the extraction of silver, silver is extracted as an anionic complex.

(c) Nickel is purified by Mond's process.

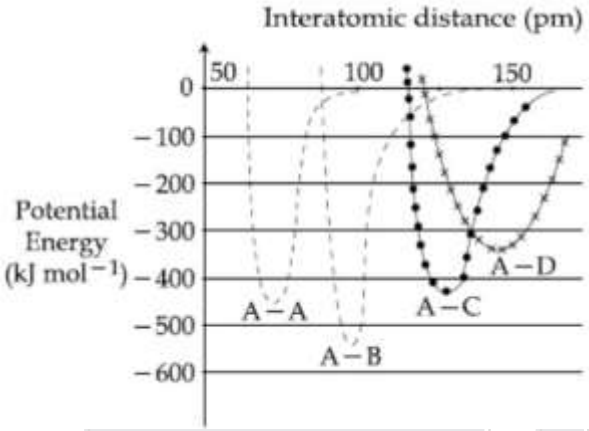
(d) Zr and Ti are purified by Van Arkel method.

(1) (c) and (d) only (2) (a), (b), (c) and (d) (3) (b), (c) and (d) only (4) (a), (c) and (d) only

Ans. **(2)**

Sol. All statements are correct.

6. The intermolecular potential energy for the molecules A, B, C and D given below suggests that :



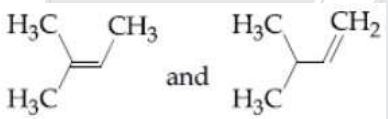
(1) A-D has the shortest bond length
(2) A-A has the largest bond enthalpy
(3) D is more electronegative than other atoms.
(4) A-B has the stiffest bond.

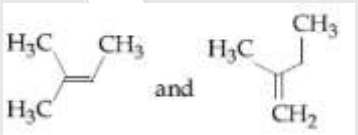
Ans. (4)

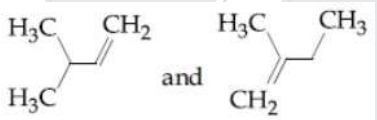
Sol. Bond enthalpy of AB bond is highest so A-B bond is more strong and B is highest electronegative atom.

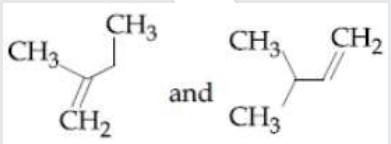
Order of bond length ⇒ A–A < A–B < A–C < A–D

7. When neopentyl alcohol is heated with an acid, it shlowly converted into an 85 : 15 mixture of alkenes A and B, respectively. What are these alkenes ?

(1) 

(2) 

(3) 

(4) 

Ans. (2)

Sol.

8. The region in the lectromagnetic spectrum where the Balmer series lines appear is :

(1) Infrared (2) Microwave (3) Ultraviolet (4) Visible

Ans. (4)

Sol. In hydrogen spectrum maximum lines of Balmer series lies in visible region.

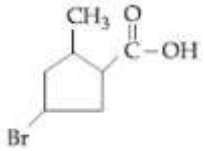
9. On combustion of Li, Na and K in excess of air, the major oxides formed, respectively, are :

(1) Li_2O, Na_2O and K_2O_2 (2) Li_2O_2, Na_2O_2 and K_2O_2
(3) Li_2O, Na_2O_2 and K_2O (4) Li_2O, Na_2O_2 and KO_2

Ans. (4)

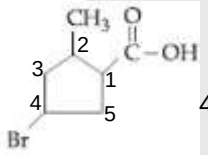
Sol. On heating in excess air Li form oxide sodium form peroxide while K, Rb, Cs form superoxide.

10. The IUPAC name of the following compound is :

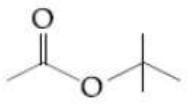
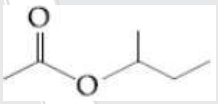
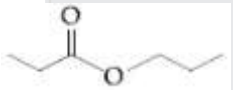
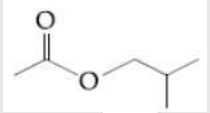


(1) 3-Bromo-5-methylcyclopentane
(2) 3-Bromo-5-methylcyclopentanoic
(3) 5-Bromo-5-methylcyclopentanoic
(4) 4-Bromo-2-methylcyclopentane carboxylic acid

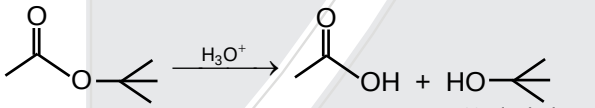
Ans. (4)

Sol.  4-Bromo-2-methylcyclopentane carboxylic acid

11. An organic compound (A) (molecular formula $C_6H_{12}O_2$) was hydrolysed with dil. H_2SO_4 to give a carboxylic acid (B) and an alcohol (C). 'C' gives white turbidity immediately when treated with anhydrous $ZnCl_2$ and conc. HCl. The organic compound (A) is :

(1) 
(2) 
(3) 
(4) 

Ans. **(1)**

Sol. 

12. On heating, lead (II) nitrate gives a brown gas (A). The gas (A) on cooling changes to a colourless solid/liquid (B). (B) on heating with NO changes to ablue solid (C). The oxidation number of nitrogen in solid (C) is :

(1) +5 (2) +3 (3) +4 (4) +2

Ans. **(2)**

Sol. $Pb(NO_3)_2 \xrightarrow{\Delta} PbO + 2NO_2(g)$ (brown gas)

'B'

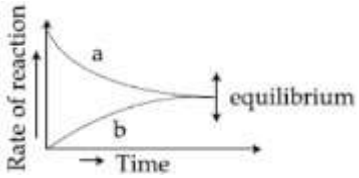
$2NO_2(g) \xrightarrow{\text{cooling}} N_2O_4$

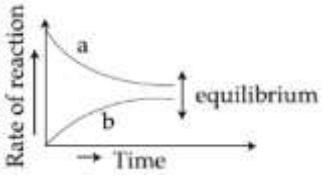
'B' 'C'

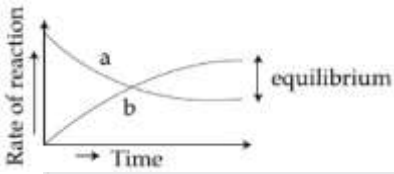
$NO_2(g) + NO(g) \longrightarrow \overset{+3}{N_2O_3}$

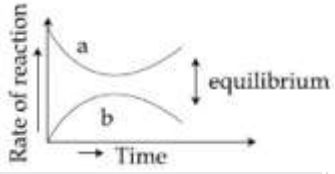
'D'

13. For the equilibrium A $\rightleftharpoons$ B, the variation of the rate of the forward (a) and reverse (b) reaction with time is given by :

(1) 

(2) 

(3) 

(4) 

Ans. (1)

Sol. At equilibrium, rate of forward reaction = Rate of backward reaction.

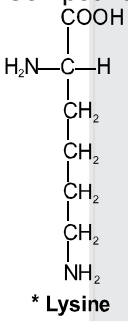
14. Which of the following will react with $CHCl_3$ + alc. KOH ?

(1) Adenine and lysine (2) Adenine and thymine

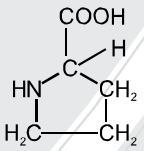
(3) Adenine and proline (4) Thymine and proline

Ans. (1)

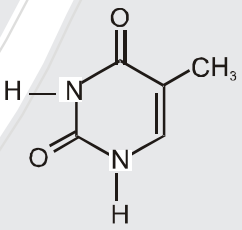
Sol. Compounds having 1° amine give carbylamine reaction with $CHCl_3$ & alc. KOH



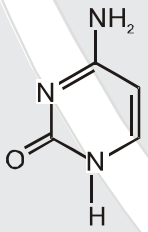
* Lysine



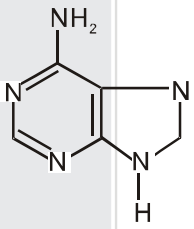
Proline



Thymine (T)



Cytosine (C)

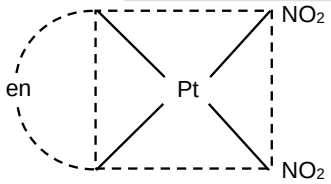


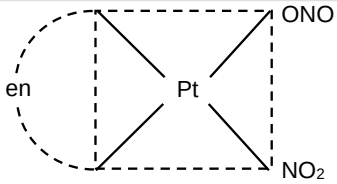
Adenine (A)

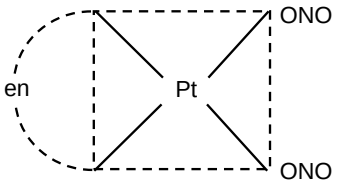
15. The number of isomers possible for $[Pt(en)(NO_2)_2]$ is :

(1) 1 (2) 2 (3) 3 (4) 4

Ans. (3) **Sol.** $[Pt(en)(NO_2)_2]$

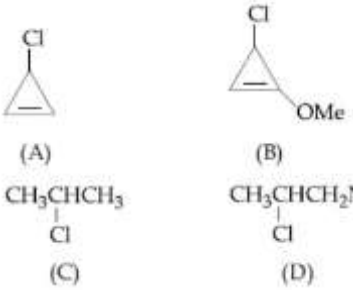






So, total possible isomers are 3.

16. The decreasing order of reactivity of the following organic molecules towards $AgNO_3$ solution is :

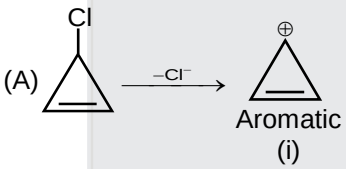


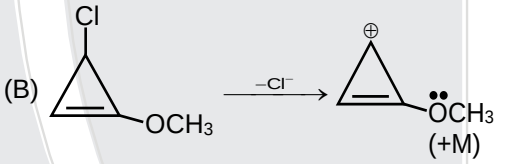
(1) (C) > (D) > (A) > (B)
(2) (A) > (B) > (C) > (D)
(3) (B) > (A) > (C) > (D)
(4) (A) > (B) > (D) > (C)

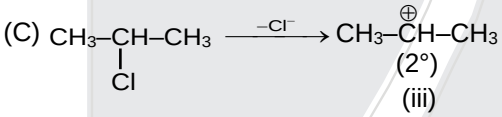
Ans. **(3)**

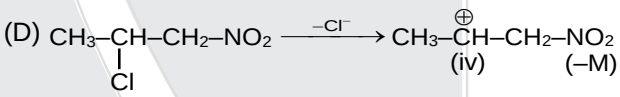
Sol. Given reaction is S_N1 reaction. In S_N1 reaction

$$\boxed{\text{Rate of reaction} \propto \text{Stability of } C^+}$$









Stability of C^+ : ii > i > iii > iv

Reactivity order : B > A > C > D

17. Match the following :

(i) Foam	(a) smoke
(ii) Gel	(b) cell fluid
(iii) Aerosol	(c) jellies
(iv) Emulsion	(d) rubber
	(e) froth
	(f) milk

(1) (i) – (d), (ii) – (b), (iii) – (a), (iv) – (e)
(2) (i) – (e), (ii) – (c), (iii) – (a), (iv) – (f)
(3) (i) – (d), (ii) – (b), (iii) – (e), (iv) – (f)
(4) (i) – (b), (ii) – (c), (iii) – (e), (iv) – (d)

Ans. **(2)**

Sol. From NCERT [Surface chemistry]

Dispersed phase	Dispersion medium	Type of colloid	Examples
Solid	Solid	Solid sol	Some coloured glasses and gem stones
Solid	Liquid	Sol	Paints, cell fluids
Solid	Gas	Aerosol	Smoke, dust
Liquid	Solid	Gel	Cheese, butter, jellies
Liquid	Liquid	Emulsion	Milk, hair cream
Liquid	Gas	Aerosol	Fog, mist, cloud, insecticide sprays
Gas	Solid	Solid sol	Pumice stone, foam rubber
Gas	Liquid	Foam	Froth, whipped cream, soap lather

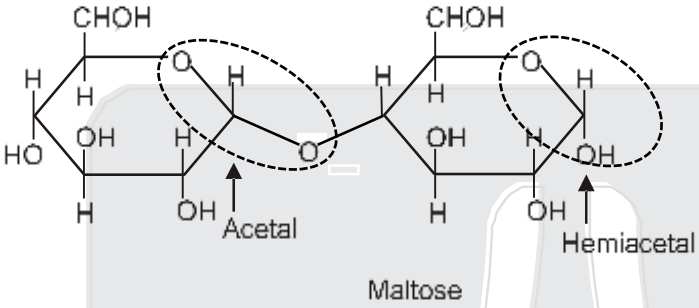
18. What are the functional groups present in the structure of maltose ?

(1) Two acetals (2) One acetal and one ketal

(3) One ketal and one hemiketal (4) One acetal and one hemiacetal

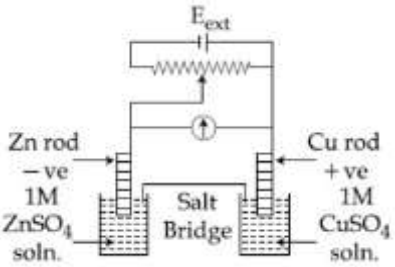
Ans. (4)

Sol.



Maltose

19.



$E^0_{Cu^{2+}|Cu}$ = +0.34 V

$E^0_{Zn^{2+}|Zn}$ = –0.76 V

Identify the incorrect statement from the options below for the above cell :

(1) If E_{ext} = 1.1 V, no flow of e^- or current occurs

(2) If E_{ext} < 1.1 V, Zn dissolves at anode and Cu deposits at cathode

(3) If E_{ext} > 1.1 V, e^- flow from Cu to Zn

(4) If E_{ext} > 1.1 V, Zn dissolves at Zn electrode and Cu deposits at Cu electrode

Ans. (4)

Sol. $E^\circ_{cell} = E^\circ_{Cu^{2+}|Cu} - E^\circ_{Zn^{2+}|Zn} = 1.1$ V

so If E = 1.1 V no electron will flow

At E > 1.1 V cell act as electrolytic cell and electron will flow from Cu to Zn.

At E < 1.1 V cell act as electrochemical cell so Zn dissolve and Cu deposit.

20. The pair in which both the species have the same magnetic moment (spin only) is :

(1) $[Cr(H_2O)_6]^{2+}$ and $[Fe(H_2O)_6]^{2+}$ (2) $[Co(OH)_4]^{2-}$ and $[Fe(NH_3)_6]^{2+}$

(3) $[Cr(H_2O)_6]^{2+}$ and $[CoCl_4]^{2-}$ (4) $[Mn(H_2O)_6]^{2+}$ and $[Cr(H_2O)_6]^{2+}$

Ans. (1)

Sol.

	No. of unpaired e^-
$[Cr(H_2O)_6]^{2+} \Rightarrow Cr^{2+} \Rightarrow 3d^4 \Rightarrow t_{2g}^{1,1,1}, e_g^{1,0}$	4
$[Fe(H_2O)_6]^{2+} \Rightarrow Fe^{2+} \Rightarrow 3d^6 \Rightarrow t_{2g}^{2,1,1}, e_g^{1,1}$	4
$[Fe(NH_3)_6]^{2+} \Rightarrow Fe^{2+} \Rightarrow 3d^6 \Rightarrow t_{2g}^{2,1,1}, e_g^{1,1}$	4
$[Co(OH)_4]^{2-} \Rightarrow Co^{2+} \Rightarrow 3d^7 \Rightarrow e^{2,2}, t_2^{1,1,1}$	3
$[CoCl_4]^{2-} \Rightarrow Co^{2+} \Rightarrow 3d^7 \Rightarrow e^{2,2}, t_2^{1,1,1}$	3
$[Mn(H_2O)_6]^{2+}, \Rightarrow Mn^{2+} \Rightarrow 3d^5 \Rightarrow t_{2g}^{1,1,1}, e_g^{1,1}$	5

So $[Cr(H_2O)_6]^{2+}$ and $[Fe(H_2O)_6]^{2+}$ have same magnetic moment (spin only)

SECTION – 2 : (Maximum Marks : 20)

- This section contains **FIVE (05)** questions. The answer to each question is **NUMERICAL VALUE** with two digit integer and decimal upto one digit.
- If the numerical value has more than two decimal places **truncate/round-off** the value upto **TWO** decimal places.
  - Full Marks : **+4** If ONLY the correct option is chosen.
  - Zero Marks : **0** In all other cases

खंड 2 (अधिकतम अंक: 20)

- इस खंड में **पाँच (05)** प्रश्न है। प्रत्येक प्रश्न का उत्तर संख्यात्मक मान **(NUMERICAL VALUE)** हैं, जो द्वि–अंकीय पूर्णांक तथा दशमलव एकल–अंकन में है।
- यदि संख्यात्मक मान में दो से अधिक दशमलव स्थान है , तो संख्यात्मक मान को दशमलव के दो स्थानों तक **ट्रंकेट/राउंड ऑफ (truncate/round-off)** करें।
- अंकन योजना :
  - पूर्ण अंक : **+4** यदि सिर्फ सही विकल्प ही चुना गया है।
  - शून्य अंक : **0** अन्य सभी परिस्थितियों में।

21. A 20.0 mL solution containing 0.2 g impure H_2O_2 reacts completely with 0.316 g of $KMnO_4$ in acid solution. The purity of H_2O_2 (in %) is ..... (mol. wt. of H_2O_2 = 34; mol. wt. of $KMnO_4$ = 158)

Ans. (85)

Sol. Let mass of pure H_2O_2 is x gram

$$\underset{vf=5}{MnO_4^-} + \underset{vf=2}{H_2O_2} \longrightarrow \underset{+7}{Mn^{2+}} + \underset{-1}{O_2} \quad (+2,\ 0)$$

Eq. of H_2O_2 = Eq. of MnO_4^-

$$\left[\frac{x}{34}\right]2 = \left[\frac{0.316}{158}\right]5$$

$x = 0.17$

So, % purity of H_2O_2 solution = $\frac{0.17}{0.2} \times 100 = 85\%$

22. The mass of ammonia in grams produced when 2.8 kg of dinitrogen quantitatively reacts with 1 kg of dihydrogen is ……

Ans. (3400)

Sol. Mole of $N_2 = \frac{2800}{28} = 100$ & Mole of $H_2 = \frac{1000}{2} = 500$

	$N_2(g)$	+	$3H_2(g)$	$\longrightarrow$	$2NH_3(g)$
Initial mole	100		500		Limiting reagent is N_2
Final mole	0		500 – 300		200

Mass of NH_3 formed = 200 × 17 = 3400 gram

23. If 75% of a first order reaction was completed in 90 minutes, 60% of the same reaction would be completed in approximately (in minutes) ……..
(Take : log 2 = 0.30 ; log 2.5 = 0.40)

Ans. (60)

Sol. $T = \frac{2.303}{K} \log\left[\frac{100}{100-x\%}\right]$

$T_{75\%} = \frac{2.303}{K} \log\left[\frac{100}{25}\right] = 90$

$T_{60\%} = \frac{2.303}{K} \log\left[\frac{100}{40}\right]$

$\frac{T_{75\%}}{T_{60\%}} = \frac{2\log 2}{\log 2.5} \Rightarrow \frac{90}{T_{60\%}} = \frac{2\times 0.3}{0.4}$

$T_{60\%} = \frac{90\times 4}{6} = 60$ min.

24. At 300 K, the vapour pressure of a solution containing 1 mole of n-hexane and 3 moles of n-heptane is 550 mm of Hg. At the same temperature, if one more mole of n-heptane is added to this solution, the vapour pressure of the solution increases by 10 mm of Hg. What is the vapour pressure in mmHg of n-heptane in its pure state …… ?

Ans. (600)

Sol. $P_{total} = P^o_{hexane} \cdot X_{hexane} + P^o_{heptane} \cdot X_{heptane}$

$550 = [P^o_{hexane}] \times \frac{1}{4} + [P^o_{heptane}] \times \frac{3}{4}$ ….(i)

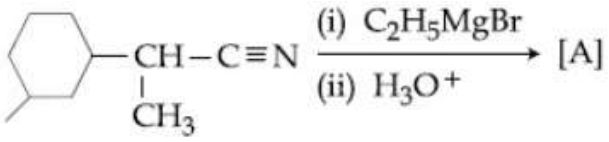
After mixing 1 mole n-heptane

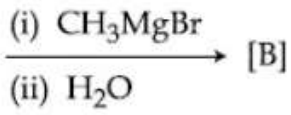
$560 = [P^o_{hexane}] \times \frac{1}{5} + [P^o_{heptane}] \times \frac{4}{5}$ ….(ii)

On solving eq. (i) and (ii)

$P^o_{heptane} = 600$ mm of Hg

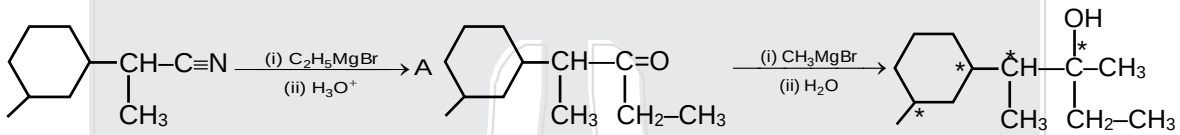
25. The number of chiral centres present in [B] is .....





Ans. (4)

Sol.



Announcing

Rank BOOSTER Part-2

An Exhaustive
Online Preparation Course
of 3 Weeks for
JEE (Advanced) 2020

Course Features

- New **specially designed** 18 Advanced Worksheets
- **Online** Live Discussion class (6 per week) each of 1.5 hours for Advanced worksheets
- Exclusive **Unit wise Work Sheets** covering tough & important concepts
- **Revision DPPs** for more practice on daily basis
- Medium of **Teaching** and **Content** would be only **English**
- **Gyan Sutra** booklet: Specially designed package for quick revision of P, C & M

Course Brief

The Rank Booster Part-2 course is recommended for students aiming a top rank in JEE (Advanced) 2020. The course structure is tailored to better the chances through rigorous practice of 18 Advanced Worksheets and their exhaustive conceptual discussion. Also, unit wise worksheets for self practice to strengthen tough and important concepts.

Boosting Aspirations to Reality

Course Starts	Course Duration	Course Mode	Course Fee (Inclusive of GST)
07 Sept.	3 Weeks	Online	₹5000/- Non Refundable

Limited Seats

Resonance®
Educating for better tomorrow

Register on
www.resonance.ac.in
Toll Free: 1800 258 5555
7023003307, 7728890101 | 7340010333