



## CHEMISTRY

### BOOKS - AIIMS PREVIOUS YEAR PAPERS

#### AIIMS 2015

#### Chemistry

1. Which of the following volume (V) - temperature (T) plots represents the behaviour of one mole of an ideal gas at one atmospheric pressure?

A. 

B. 

C. 

D. 

Answer: A

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2.  $[Fe(H_2O)_5NO]^{2+}$  is a complex formed during the brown ring test for  $NO_3^-$  ion. In this complex.

A. there are three unpaired electrons so that its magnetic moment

is 3.87 BM

B. NO transfer its electron to  $Fe^{2+}$  so that iron as Fe (I) and NO as

$NO^+$

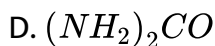
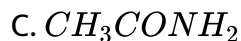
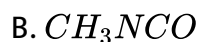
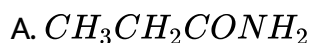
C. the colour is because of charge transfer

D. All of the above statements are correct

Answer: D

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3. An organic compound having molecular mass 60 is found to contain  $C = 20\%$ ,  $H = 6.67\%$ , and  $N = 46.67\%$ , while rest is oxygen. On heating, it gives  $NH_3$  along with a solid residue. The solid residue gives violet color with alkaline copper sulphate solution. The compound is



Answer: D



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4.  $KO_2$  is used in oxygen cylinders in space and submarines because it



B. produces ozone

C. eliminates moisture

D. absorbs  $CO_2$  and increases  $O_2$  content

**Answer: D**

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5. The order of reactivity of halides towards  $S_N1$  mechanism is

A. benzy1 > ally1° > 2° > 3° > Me

B. Me > 1° > 2° > 3° > ally1 > benzy1

C. 3° > 2° > 1° > Me > ally1 > benzy1

D. benzy1 > ally1 > 3° > 2° > 1° > Me

**Answer: D**

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6. Arrange the given set of compounds in order of increasing boiling points.

I. -chloropropane

II. Iso - propyl chloride

III. 1 - chlorobutane

A.  $II < III < I$

B.  $I < II < III$

C.  $II < I < III$

D.  $III < I < II$

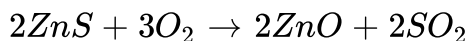
**Answer: C**

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$\Delta G^\circ$  for the following reaction



would be:

A.  $-731kJ$

B.  $-787kJ$

C.  $-534kJ$

D.  $-554kJ$

**Answer: A**



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8. The shapes of  $SF_4$  and  $XeF_2$  respectively are

A. trigonal bipyramidal and trigonal bipyramidal

B. see-saw and linear

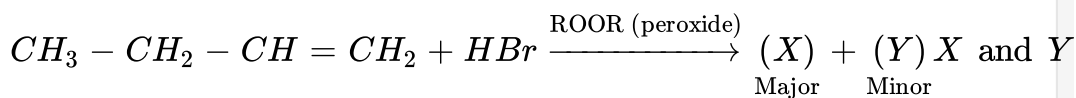
C. T- shape and linear

D. square planar and trigonal bipyramidal

**Answer: B**

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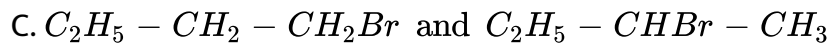
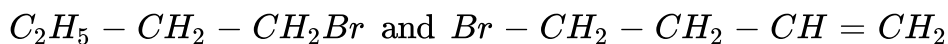
9.



respectively are



B.



Answer: C

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10.  $a$  moles of  $PCl_5$  are heated in a closed container to equilibrate  $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$  at pressure of  $p$  atm . If  $x$  moles of  $PCl_5$  dissociate at equilibrium , then

A.  $\frac{x}{a} = \left( \frac{K_P}{P} \right)^{1/2}$

B.  $\frac{x}{a} = \frac{K_P}{K_P + p}$

C.  $\frac{x}{a} = \left( \frac{K_P}{K_P + p} \right)^{1/2}$

D.  $\frac{x}{a} = \left( \frac{K_P + p}{K_P} \right)^{1/2}$

Answer: C

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11. Which of the following metal Fe, Zn, Pb, Ag and Pt do not give a metal nitrate on treatment with concentrated  $HNO_3$ ?

A. Fe and Pt

B. Fe and Zn

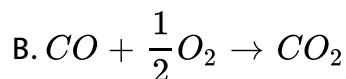
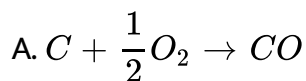
C. Fe , Ag and Pt

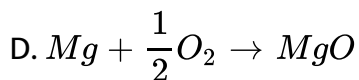
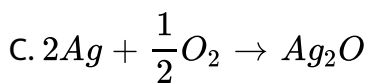
D. Pb , Ag and Pt

**Answer: A**

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12.  $\Delta G^\circ$  versus T plot the Ellingham 's diagram slopes downward for the reaction



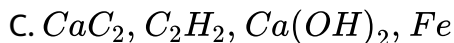
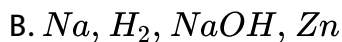
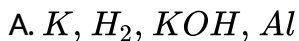


**Answer: A**



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**13.** When a substance A reacts with water it produces a combustible gas B and a solution of substance C in water. When another substance D reacts with this solution of C, it also produces the same gas B on warming but D can produce gas B on reaction with dilute sulphuric acid at room temperature. A imparts a deep golden yellow colour a smokeless flame to Bunsen burner. A,B,C, and D respectively are :



**Answer: B**

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14. The volume of a colloidal particle  $V_C$  as compared to the volume of a solute particle in a true solution  $V_S$  could be

A.  $\frac{V_c}{V_s} = 10^{-3}$

B.  $\frac{V_c}{V_s} = 10^3$

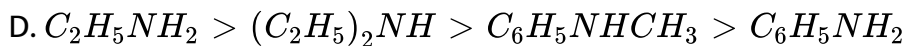
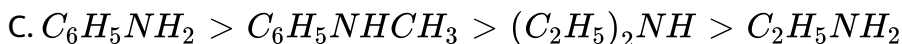
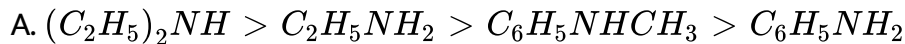
C.  $\frac{V_c}{V_s} \approx 10$

D.  $\frac{V_c}{V_s} \approx 10^{22}$

**Answer: B**

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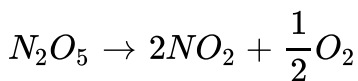
15. Point out the correct decreasing order of  $pK_b$  values of following amines  $C_2H_5NH_2$ ,  $C_6H_5NHCH_3$ ,  $(C_2H_5)_2NH$  and  $C_6H_5NH_2$



Answer: C

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16. If the rate of decomposition of  $N_2O_5$  during a certain time interval is  $2.4 \times 10^{-4} \text{ mol L}^{-1} \text{ min}^{-1}$ .



What is the rate of formation of  $NO_2$  and  $O_2$   $\text{mol L}^{-1} \text{ min}^{-1}$ ?

A.  $2.3 \times 10^{-5}$  and  $1.2 \times 10^{-5}$  respectively

B.  $3.8 \times 10^{-4}$  and  $0.6 \times 10^{-4}$  respectively

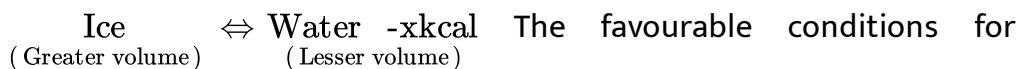
C.  $2.4 \times 10^{-4}$  and  $1.5 \times 10^{-4}$  respectively

D.  $4.8 \times 10^{-4}$  and  $1.2 \times 10^{-4}$  respectively

**Answer: D**

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**17. Consider the reaction equilibrium**



forward reaction are

A. low temperature , high pressure and excess of ice

B. low temperature , low pressure and excess of ice

C. high temperature ,low pressure and excess of ice

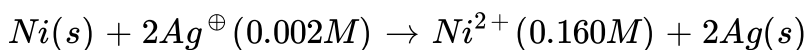
D. high temperature , high pressure and excess of ice

**Answer: D**



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**18.** Calculate the *EMF* of the cell in which the following reaction takes place :



A. 0.73 V

B. 0.91 V

C. 0.62 V

D. 0.34 V

**Answer: B**



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19. Point out of the true statement.

- A. photochemical smog occurs in a day time while the classical smog occurs in the morning hours
- B. Classical smog has an oxidizing character whereas the photochemical smog is reducing in character
- C. During formation of smog, the level of ozone in the atmosphere goes down
- D. Classical smog is good for health but not photochemical smog

**Answer: C**



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20. One mole of magnesium in the vapor state absorbed  $1200\text{kJmol}^{-1}$  of energy. If the first and second ionization energies of  $Mg$  are 750 and  $1450\text{kJmol}^{-1}$ , respectively, the final composition of the mixture is

A.  $86\% Mg^+ + 14\% Mg^{2+}$

B.  $69\% Mg^+ + 31\% Mg^{2+}$

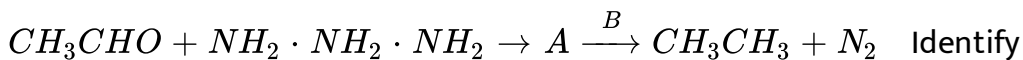
C.  $14\% Mg^+ + 86\% Mg^{2+}$

D.  $31\% Mg^+ + 69\% Mg^{2+}$

Answer: B

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21. In the following reaction



A and B .

A.  $CH_3CH = NNH_2$  and  $C_2H_5ONa$



B.  $CH_3CH_2 - NH_2$  and  $C_2H_5ONa$

C.  $CH_3 - HN - NH - CH_3$  and  $C_2H_5OH$

D.  $CH_3CH_2NH_2$  and  $C_2H_5OH$

**Answer: A**

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22. In the distance between  $Na^+$  and  $Cl^-$  ions in sodium chloride crystal is  $X$  pm, the length of the edge of the unit cell is

A.  $4y$  pm

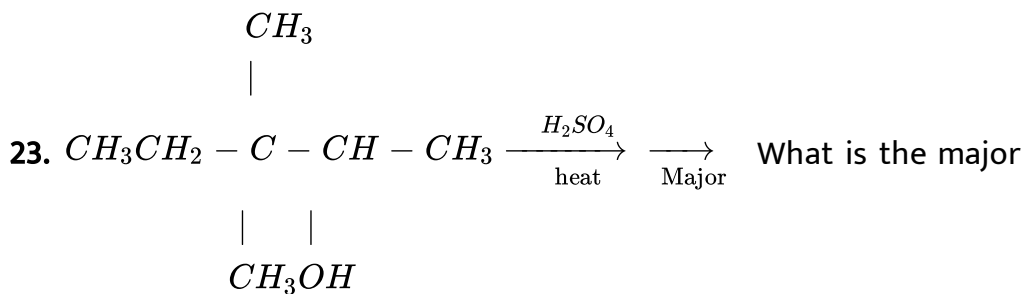
B.  $y/4$  pm

C.  $y/2$  pm

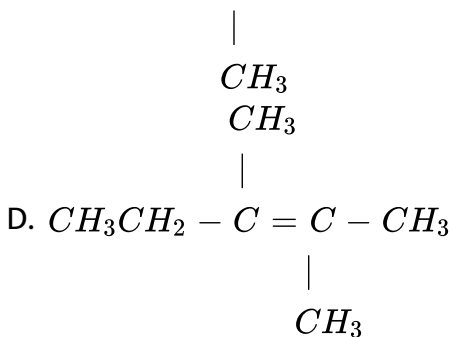
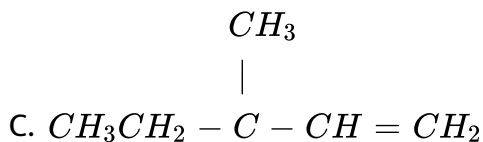
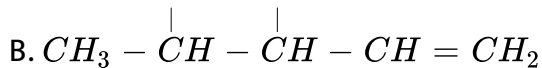
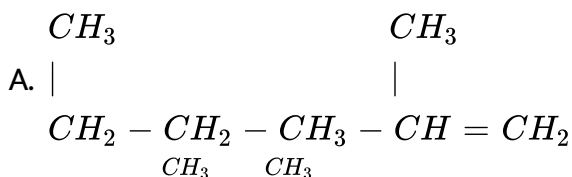
D.  $2y$  pm

**Answer: D**

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product P in the above reaction?



Answer: D

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24. Carbon and oxygen forms two compound . Carbon content in one of them is 42.9 % while in the other is 27.3 % . The given data is in support with

- A. law of definite proportions
- B. law of reciprocal proportions
- C. law of multiple proportions
- D. law of conservation of mass

**Answer: C**

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25. 100 mL of liquid A was mixed with 25 mL of liquid B to give non-ideal solution of A-B. The volume of this mixture will be

A. 75 mL

B. 125 mL exact

C. fluctuating between 75 mL to 125 mL

D. close to 125 mL but not exceed that 125 mL.

**Answer: D**



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**26.** Salts of metals X, Y and Z are electrolysed under identical condition using same quantity of electricity . If was observed that 4.2 g of X, 5.4 g of Y and 19.2 g of Z were deposited at respective cathode . If the atomic weights of X , Y, Z are 7, 27 and 64 respectively , then their ratio of valencies is

A. 1 : 2 : 3

B. 1 : 3 : 2

C. 2 : 3 : 1

D. 3 : 2 : 2

**Answer: B**



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27. Aniline is reacted with bromine water and the resulting product is treated with an aqueous solution of sodium nitrite in presence of hydrochloric acid. The compound so formed is converted into a tetrafluoroborate which is subsequently heated. The final product is .

A. 2, 4, 6 - tribromofluorobenzene

B. 1, 3, 5 - tribromobenzene

C. p - bromoaniline

D. o - bromofluorbenzene

**Answer: A**



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28. Three spheres of the first layer and three of the second layer enclosed a site at the centre in a closest packing arrangement this site is called

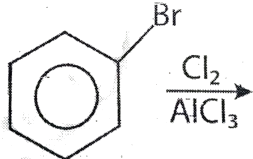
- A. interstitial void
- B. tetrahedral void
- C. octahedral void
- D. cubic void

**Answer: C**

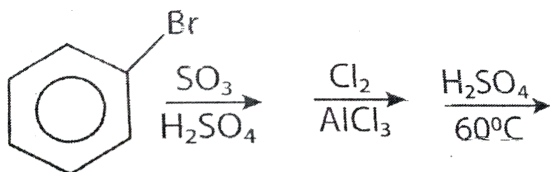


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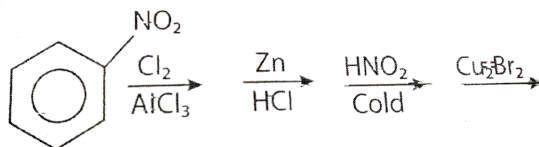
29. Which of the following is the best method for synthesis of 1 - bromo -3- chlorobenzene?



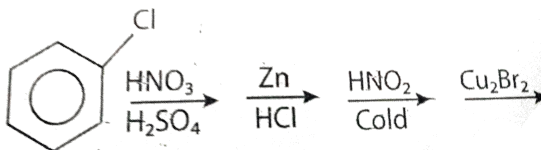
A.



B.



C.

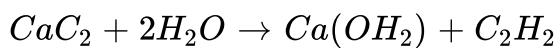


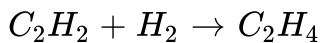
D.

Answer: C

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30. The formation of polyethylene from calcium carbide takes place as follows:





The amount of polyethylene obtained from 64 kg of  $CaC_2$

A. 27 kg

B. 24 kg

C. 22 kg

D. 28 kg

**Answer: D**



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**31.** Find out the degeneracy of hydrogen atom that has the energy

equal to  $-\frac{R_H}{9}$  ( $R_H$  = Rydberg constant ).

A. 6



B. 8

C. 5

D. 9

**Answer: D**

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**32.** Consider the statement  
I. Bond length in  $N_2^+$  is  $0.02\text{\AA}$  greater than in  $N_2$ .

II. Bond length of  $NO^+$  is  $0.09\text{\AA}$  less than in NO.

III  $O_2^{2-}$  has shorter bond length than  $O_2$ .

Which of the following statements are true?

A. I and II

B. II and III

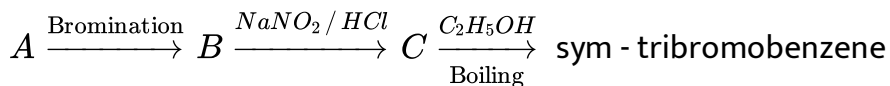
C. I, II and III

D. I and III

Answer: A

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33. In the following reaction, B is



A. salicylic acid

B. benzoic acid

C. phenol

D. 2, 4, 6 tribromoaniline

Answer: D

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**34.** Assertion (A) Both Frenkel and Schottky defects are stoichiometric defects.

Reason (R ) Both defects change the density of the crystalline solid.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: C**



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**35.** Assertion: In any transition series the magnetic moment of  $M^{2+}$  ions first decreases

Reason: In a transition series, the number of unpaired electrons first increases and then decreases.

- A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.
- B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- C. If Assertion is true but Reason is false.
- D. If both Assertion and Reason are false.

**Answer: A**

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**36.** Assertion (A) Benzaldehyde is less reactive in comparison to ethanal towards nucleophilic attack.

Reason (R) All the carbon atoms of benzaldehyde are  $sp^2$  - hybridised.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

**Answer: B**

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**37.** Assertion (A): The osmotic pressure of  $0.1M$  urea solution is less than  $0.1MNaCl$  solution.

Reason (R ): Osmotic pressure is not a colligative property.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: C**

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**38.** Assertion (A) Gabriel phthalimide reaction can be used to prepare aryl and alkyl amines.

Reason (R ) Aryl halides have same reactivity as alkyl halides towards nucleophilic substitution reactions.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: D**



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**39.** Assertion (*A*): *Fe* is protected from corroding by connecting *Mg* metal with it.

Reason (*R*): *Fe* acts as cathode and *Mg* as anode which gradually disappears.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: A**

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**40.** Assertion (A) Elementary phosphorus exists in three principal allotropic forms , ie .white (or yellow),red (or violet ) and black.

Reason (R ) Of the three forms, white phosphorus is the most important and most reactive.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.



B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: A**

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**41.** Assertion (A) Chlorine reacts more rapidly with  $H_2$  in comparison to  $D_2$ .

Reason (R ) D -CL bond is stronger in comparison to H - Cl bond .

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: B**

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**42.** Assertion: A solution of sucrose in water is dextrorotatory. But on hydrolysis in the presence of a little hydrochloric acid, it becomes laevaorotatory.

Reason : Sucrose on hydrolysis gives unequal amounts of glucose and fructose. As a result of this, change in sign of rotation is observed.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: C**

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43. (A) tert-Butyl methyl ether on cleavage with HI at 373K gives tert-butyl iodide and methanol.

(R) The reaction occurs by  $S_N2$  mechanism.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: D**

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**44.** Assertion: in comparison to ethyl chloride it is difficult to carry out nucleophilic on vinyl chloride

Reason: Vinyl group is electron-donating .

- A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.
- B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- C. If Assertion is true but Reason is false.
- D. If both Assertion and Reason and false.

**Answer: C**

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45. Assertion (A) Ranitidine is used to treat hyperacidity and brompheniramine is used to treat hyperacidity .

Reason (R ) Both of these drugs are antihistamines.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: B**



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**46.** Assertion (A) Graphite is a good conductor of heat and electricity.

Reason (R ) Graphite has all the electrons firmly held together in  $C - C\sigma$  bonds.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

**Answer: C**



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**47.** Assertion (A): Sodium reacts with oxygen to form  $Na_2O_2$  whereas potassium reacts with oxygen to form  $KO_2$ .

Reason (R ): Potassium is more reactive than sodium.

- A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.
- B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- C. If Assertion is true but Reason is false.
- D. If both Assertion and Reason and false.

**Answer: B**

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**48.** Assertion (A) o-and p-nitrophenol can be separated by steam distillation.

Reason (R ) o-Nitrophenol is steam volatile whereas p-nitrophenol is not steam volatile.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

**Answer: C**

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**49.** Assertion (A) Friedel - Crafts reaction benzene with n - propyl chloride on heating produce isopropyl benzene

Reason (R ) Benzene undergoes electrophilic substitution easily.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.



B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason and false.

**Answer: B**

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**50.** Assertion (A) Presence of green plant is essential for greenhouse effect.

Reason (R ) Chlorophyll of green plants causes greenhouse effect.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

**Answer: D**

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**51.** Assertion : Neoprene can be further hardened by heating on the presence of sulphur

Reason : Neoprene contains allylic double bonds which help in introducing sulphur bridges between different polymer chains

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

**Answer: A**

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52. Assertion (A)  $H_2O$  is the only hydride of group - 16 which is liquid at ordinary temperature.

Reason (R) In ice, each oxygen atom is surrounded by two covalent bonds and two hydrogen bonding.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

**Answer: B**



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**53.** Assertion: Carbonate and hydroxide ore are concentrated by froth floatation process.

Reason: In froth floatation process, pine is used because it preferentially wets the ore particles.

- A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.
- B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- C. If Assertion is true but Reason is false.
- D. If both Assertion and Reason are false.

**Answer: D**



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