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. $\left[Fe(H_2O)_5NO\right]^{2+}$ 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 compounds is

A. $CH_3CH_2CONH_2$

B. CH_3NCO

C. CH_3CONH_2

D. $(NH_2)_2CO$

Answer: D

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

A. absorbs CO_2

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_N 1 mechanism is

A. $\text{benzy1} > \text{ally1}^\circ > 2^\circ > 3^\circ > \text{Me}$

B. $\text{Me} > 1^\circ > 2^\circ > 3^\circ > \text{ally1} > \text{benzy1}$

C. $3^\circ > 2^\circ > 1^\circ > \text{Me} > \text{ally1} > \text{benzy1}$

D. $\text{benzy1} > \text{ally1} > 3^\circ > 2^\circ > 1^\circ > \text{Me}$

Answer: D

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

1. -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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7. $2Zn + O_2 \rightarrow 2ZnO, \quad \Delta G^\circ = -606J \ldots$ (i)

$2Zn + 2S \rightarrow 2ZnS, \quad \Delta G^\circ = -293J \ldots$ (ii)

$2S + 2O_2 \rightarrow 2SO_2(g), \qquad \Delta G^\circ = -408J \ldots$ (iii)

ΔG° for the following reaction

$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

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.

$CH_3 - CH_2 - CH = CH_2 + HBr \xrightarrow{\text{ROOR (peroxide)}} \underset{\text{Major}}{(X)} + \underset{\text{Minor}}{(Y)}\, X$ and Y

respectively are

A. $BrCH_2 - CH_2 - CH = CH_2$ and $C_2H_5 - CHBr - CH_3$

B. $C_2H_5 - CH_2 - CH_2Br$ and $Br - CH_2 - CH_2 - CH = CH_2$

C. $C_2H_5 - CH_2 - CH_2Br$ and $C_2H_5 - CHBr - CH_3$

D. $C_2H_5CHBr - CH_3$ and $C_2H_5 - CH_2 - CH_2Br$

Answer: C

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10. a' moles of PCl_5 are heated in a closed container to equilibriate $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ 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. ΔG° versus T plot the Ellingham 's diagram slopes downward for the reaction

A. $C + \frac{1}{2}O_2 \rightarrow CO$

B. $CO + \frac{1}{2}O_2 \rightarrow CO_2$

C. $2Ag + \frac{1}{2}O_2 \rightarrow Ag_2O$

D. $Mg + \frac{1}{2}O_2 \rightarrow MgO$

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 :

A. K, H_2, KOH, Al

B. $Na, H_2, NaOH, Zn$

C. $CaC_2, C_2H_2, Ca(OH)_2, Fe$

D. $Ca, H_2, Ca(OH)_2, Sn$

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 $C_6H_5NH_2$

A. $(C_2H_5)_2NH > C_2H_5NH_2 > C_6H_5NHCH_3 > C_6H_5NH_2$

B. $(C_2H_5)_2NH > C_6H_5NHCH_3 > C_6H_5NH_2 > C_2H_5NH_2$

C. $C_6H_5NH_2 > C_6H_5NHCH_3 > (C_2H_5)_2NH > C_2H_5NH_2$

D. $C_2H_5NH_2 > (C_2H_5)_2NH > C_6H_5NHCH_3 > C_6H_5NH_2$

Answer: C

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

$$N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$$

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

A. 2.3×10^{-5} and 1.2×10^{-5} respectively

B. 3.8×10^{-4} and 0.6×10^{-4} respectively

C. 2.4×10^{-4} and 1.5×10^{-4} respectively

D. 4.8×10^{-4} and 1.2×10^{-4} respectively

Answer: D

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17. Consider the reaction equilibrium

$\underset{(\text{Greater volume})}{\text{Ice}} \Leftrightarrow \underset{(\text{Lesser volume})}{\text{Water}}$ -xkcal The favourable conditions for 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 whiCHM the following reaction takes place :

$Ni(s) + 2Ag^{\oplus}(0.002M) \rightarrow Ni^{2+}(0.160M) + 2Ag(s)$

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 smong occurs in a day time while the classical smong occur in the morning hours

B. Classical smong has an oxidizing character whereas the photochemical smong is reducing in character

C. During formation of smong ,the level of ozone in the atmosphere goes down

D. Classical smong is good for health but not photochemical smong

Answer: C

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20. One mole of magnesium in the vapor state absored $1200kJmol^{-1}$ of enegry. If the first and second ionization energies of Mg are 750 and $1450kJmol^{-1}$, 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 $CH_3CHO + NH_2 \cdot NH_2 \cdot NH_2 \rightarrow A \xrightarrow{B} CH_3CH_3 + N_2$ Identify 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 CI^- ions in sodium chliride 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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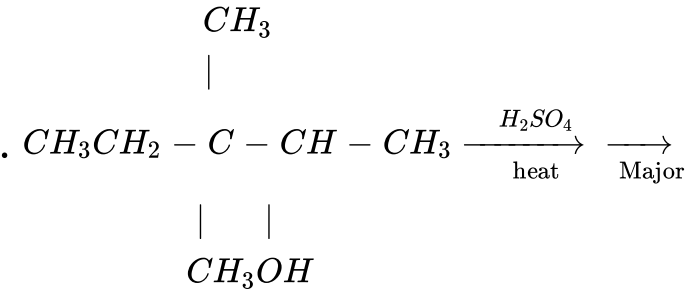
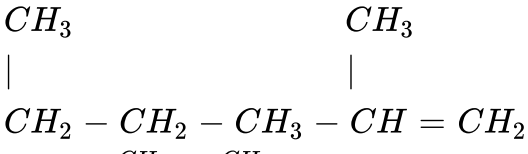
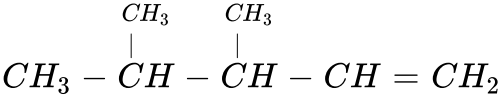
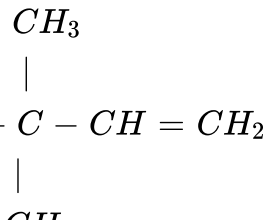
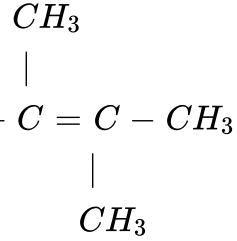
23.  What is the major product P in the above reaction?

A. 

B. 

C. 

D. 

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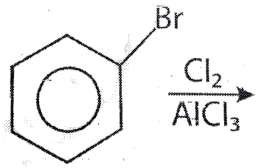
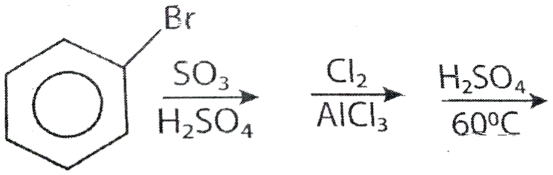
29. Which of the following is the best method for synthesis of 1 - bromo -3- chlorobenzene?

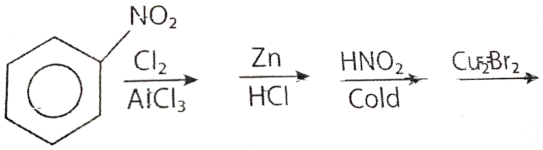
A.



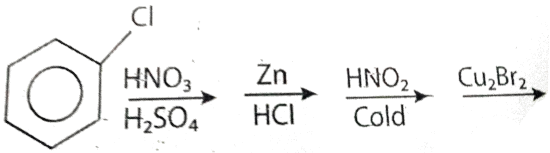
B.



C.



D.



Answer: C

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

$$CaC_2 + 2H_2O \rightarrow Ca(OH_2) + C_2H_2$$

$C_2H_2 + H_2 \rightarrow C_2H_4$

The amount of polyethylene obtained form64kg ofCaC_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 ltbrlt I. Bond length in N_2^+ is 0.02Å greater than in N_2.

II. Bond length of NO^+ is 0.09Å 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

$A \xrightarrow{\text{Bromination}} B \xrightarrow{NaNO_2 / HCl} C \xrightarrow[\text{Boiling}]{C_2H_5OH}$ sym - tribromobenzene

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 and false.

Answer: A

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36. Assertion (A) Benzaldehyde is less reactive in comparison to ethonal 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 and 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 corrosing by connecting Mg metal with it.

Reason $(R): Fe$ acts as cathode and Mg as anode which gradully 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_{N^2} 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 electicity.

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 and 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 and 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 gree 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 and false.

Answer: D

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

Reason : Neoprene contains allylic double bonds which help in introducing sulpur bridges between different polymer chams

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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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 and false.

Answer: B

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53. Assertion: Carbonate and hydroxide orea re concentrated by froth floatation process.

Reason: In froth floataiton 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 and false.

Answer: D

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