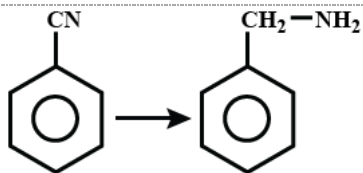


#1612369

Topic: Cyanides and isocyanides

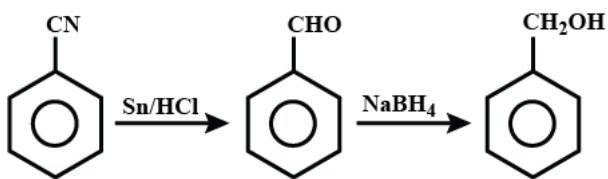


Which of the following reagent is not used to carry out the reaction?

- A H_2/Ni
- B $LiAlH_4$
- C $Sn/HCl, NaBH_4$
- D H_2/Pd

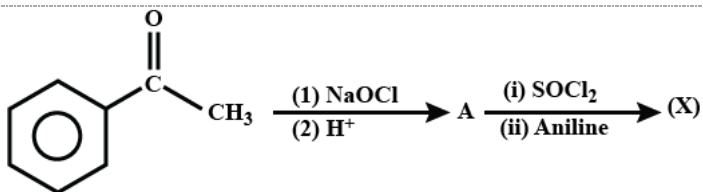
Solution

Solution:- (C) $Sn/HCl, NaBH_4$



#1612370

Topic: Chemical properties of aldehydes and ketones

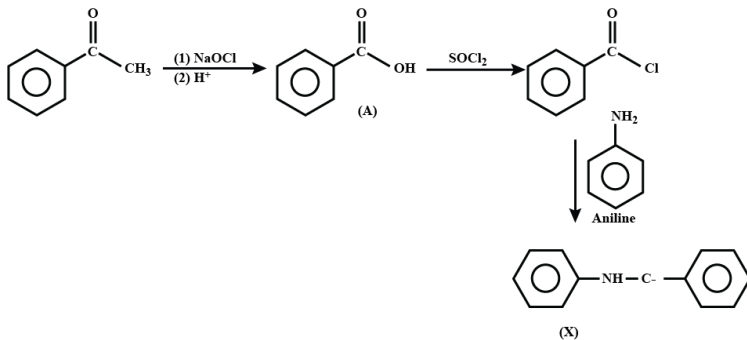


Identify the major product (x) of given reaction:-

- A
- B
- C
- D

Solution

Solution:- (A)



#1612371

Topic: Monosaccharides

The number of chiral carbon atom present in open chain and cyclic form glucose is:

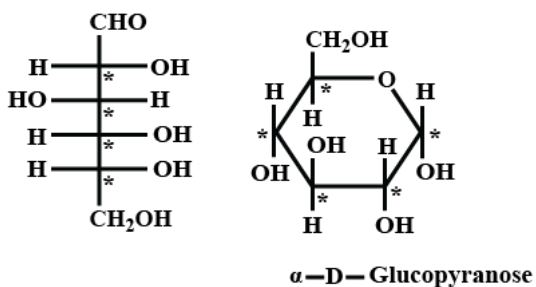
- A 3, 2
- B 4, 5
- C 5, 5
- D 6, 5

Solution

Solution:- (B) 4, 5

Open chain structure of glucose has four chiral carbon atoms (fig.1)

Cyclic structure of glucose has five chiral carbon atoms (fig.2)



#1612382

Topic: Smog

Which of the following pollution takes place in sunlight?

- A Acid rain
- B Reducing smog
- C Fog
- D Oxidizing smog

Solution

Solution:- (D) Oxidising smog

Pollution take place in sunlight is oxidizing smog, which is known as photochemical smog.

#1612384

Topic: Classification of organic compounds

Which of the following is not responsible for stability of acyclic hydrocarbon?

- A Torsional strain
- B Angle strain

C Steric strain

D Vander waal's strain

Solution

Solution:- (B) Angle strain

Angle strain is found in cyclic compound

#1612388

Topic: Behaviour of real gases - Deviations from ideal behaviour

Pressure of 1 mole ideal is given by

$$P = P_0 \left[1 - \frac{1}{2} \left(\frac{V_0}{V} \right)^2 \right]$$

If volume of gas change from V to $2V$. Find change in temperature.

A $\frac{2P_0V}{R} + \frac{P_0V_0^2}{4V}$

B $\frac{3P_0V}{R} + \frac{P_0V_0^2}{4V}$

C $\frac{P_0V}{4R} + \frac{P_0V_0^2}{4V}$

D $\frac{P_0V}{R} + \frac{P_0V_0^2}{4V}$

Solution

Solution:- (D) $\frac{P_0V}{R} + \frac{P_0V_0^2}{4V}$

$$\frac{nRT}{V} = P_0 \left[1 - \frac{1}{2} \left(\frac{V_0}{V} \right)^2 \right]$$

$$T = \frac{P_0V}{R} \left(1 - \frac{1}{2} \left(\frac{V_0}{V} \right)^2 \right)$$

$$T_i = \frac{P_0V}{R} \left(1 - \frac{1}{2} \frac{V_0^2}{V^2} \right)$$

$$T_f = \frac{P_0 \cdot 2V}{R} \left(1 - \frac{V_0^2}{8V^2} \right)$$

$$\Delta T = T_f - T_i = \frac{P_0V}{R} + \frac{P_0V_0^2}{4V}$$

$$\frac{nRT}{V} = P_0 \left[1 - \frac{1}{2} \left(\frac{V_0}{V} \right)^2 \right]$$

$$T = \frac{P_0 V}{R} \left[1 - \frac{1}{2} \left(\frac{V_0}{V} \right)^2 \right]$$

$$T_i = \frac{P_0 V}{R} \left[1 - \frac{1}{2} \frac{V_0^2}{V^2} \right]$$

$$T_f = \frac{P_0 2V}{R} \left[1 - \frac{V_0^2}{8V^2} \right]$$

$$\Delta T = T_f - T_i = \frac{P_0 V}{R} + \frac{P_0 V_0^2}{4V}$$

#1612392

Topic: Some commercially important polymers

The correct match for given in column B is

| Sr.No | Column I | Sr.No | Column II |
|-------|------------------------|-------|------------------------------|
| 1 | Nylon -6 | a | Zeigler Natta catalyst |
| 2 | Novolac | b | Peroxide catalyst |
| 3 | High-density polythene | C. | Condensation at high T and P |
| 4 | Polyacrylonitrile | d. | catalyzed by an acid base. |

A 1 - d, 2 - a, 3 - c, 4 - b

B 1 - a, 2 - c, 3 - b, 4 - d

C 1 - c, 2 - d, 3 - a, 4 - b

D 1 - b, 2 - c, 3 - a, 4 - d

Solution

Solution:- (C) 1 - c, 2 - d, 3 - a, 4 - b

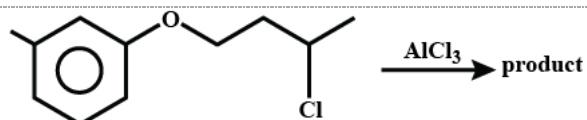
nylon-6 is condensation polymer of caprolactum, at higher temperature and pressure.

Novolac is obtained by acid or base catalyzed polymerization of phenol and formaldehyde.

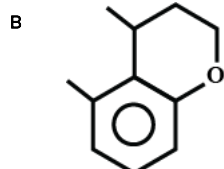
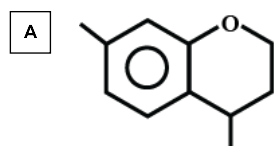
Polyarylonitrile is obtained by acrylonitrile using peroxide as catalyst.

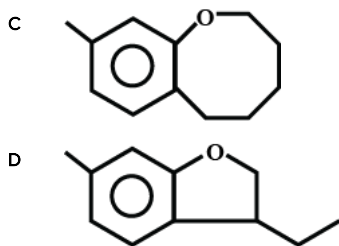
#1612394

Topic: Chemical reactions of ethers



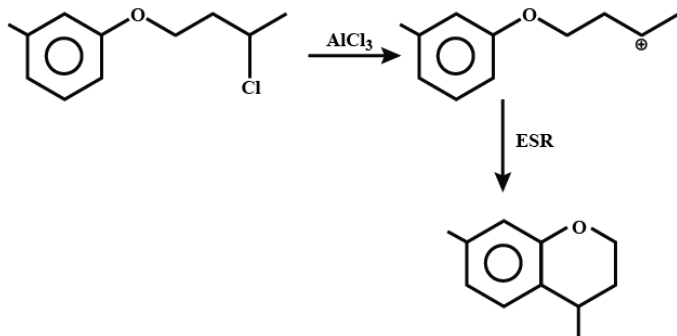
Product is:-





Solution

Solution:- (A)



#1612399

Topic: Purification of organic compounds

Which of the following is incorrect for R_f ?

- A R_f value depends on the type of chromatography
- B Value of R_f is always between 0 to 1
- C Greater the absorption, greater will be R_f value
- D R_f is independent of mobile carries

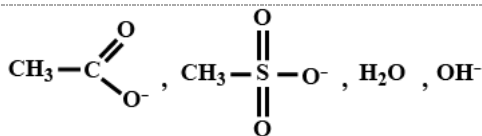
Solution

Solution:- (C) Greater the absorption, greater will be R_f value

Low polarity compounds are weakly adsorbed and has greater R_f value.

#1612403

Topic: Fundamental concepts of organic reaction mechanism

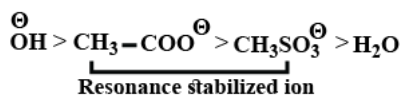


The correct nucleophilicity order of given species is:

- A $a > d > b > c$
- B $d > a > b > c$
- C $c > a > b > d$
- D $b > a > c > d$

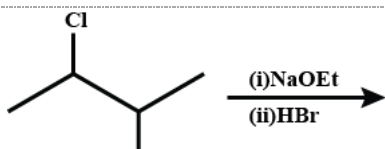
Solution

Solution:- (B) $d > a > b > c$

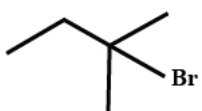
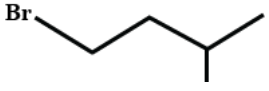
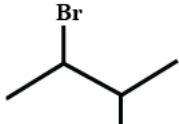
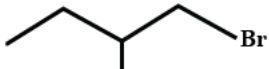


#1612406

Topic: Chemical reactions of haloalkanes - Elimination reactions

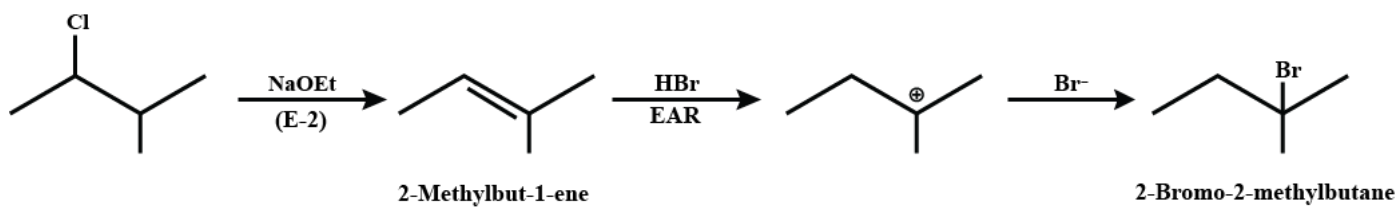


The major product of the given reaction is:

- A 
- B 
- C 
- D 

Solution

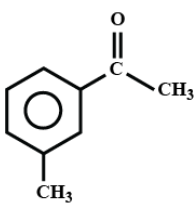
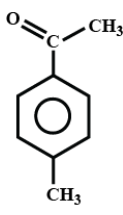
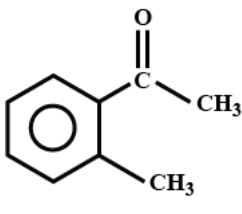
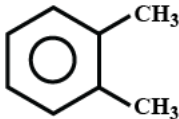
Solution:- (A)



#1612407

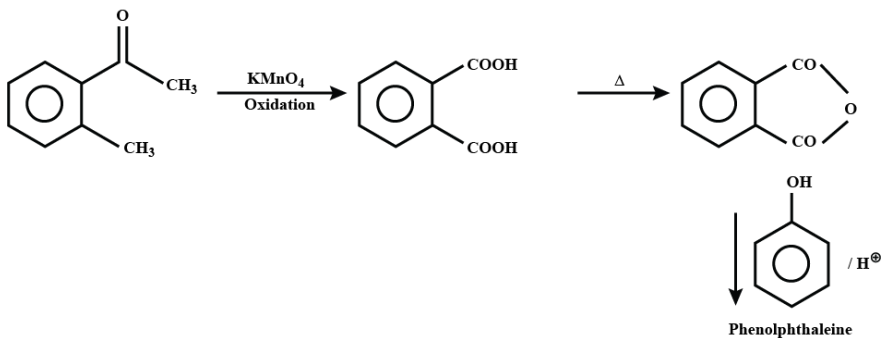
Topic: Methods of preparation of carboxylic acids

A compound x gives iodoform test. It reacts with $KMnO_4$, which on heating gives anhydride. The anhydride is used in the preparation of phenolphthalein. The compound x is:

- A 
- B 
- C 
- D 

Solution

Solution:- (C)



#1612408

Topic: Carbon

No of pentagons in C_{60} and trigons (triangles) in white phosphorus, respectively is:

- A 12, 3
- B 12, 4
- C 20, 3
- D 20, 4

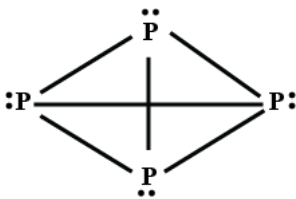
Solution

Buckminster Fullerene is an allotrope of carbon which has formula C_{60} .

It consists of pentagonal and hexagonal rings.

No of pentagons in $C_{60} = 12$

No of Triangle in white $P = 4$



#1612410

Topic: Actinoids

Maximum oxidation state of uranium and plutonium are respectively:

- A 4 and 6
- B 5 and 6
- C 6 and 7
- D 6 and 8

Solution

Solution:- (C) 6 and 7

Uranium has maximum oxidation number = + 6

Plutonium has maximum oxidation number = + 7

#1612411

Topic: Elevation in boiling point

1g of same non volatile solute is added to 100g of two different solvents A and B K_b of A: B = 1: 5

find out $\frac{(\Delta T_b)_A}{(\Delta T_b)_B}$

- A 1:10
- B 1:5

C 1:20

D 2:5

Solution

Solution:- (B) 1:5

$$(\Delta T_b)_A = (K_b)_A \times m_A$$

$$(\Delta T_b)_B = (K_b)_B \times m_B$$

$$\frac{(\Delta T_b)_A}{(\Delta T_b)_B} = \frac{1}{5} \times \frac{\frac{1}{M.W} \times \frac{1000}{100}}{\frac{1}{M.W} \times \frac{1000}{100}} = \frac{1}{5}$$

#1612415

Topic: Different types of heats/enthalpies of reaction

What is the value of $\Delta H - \Delta U$ for the combustion of Heptane (l) ?

A $-4RT$

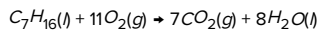
B $-3RT$

C $4RT$

D $3RT$

Solution

Solution:- (A) $-4RT$



$$\Delta n_g = 7 - 11 = -4$$

$$\Delta H = \Delta U + \Delta n_g RT$$

$$\Delta H - \Delta U = -4RT$$

#1612416

Topic: Introduction to Inert gases - group 18 Elements

Which of the following noble gas is not present in atmosphere?

A He

B Ne

C Kr

D Rn

Solution

Solution:- (D) Rn

Radon is not naturally occurring in atmosphere

#1612417

Topic: Mole and equivalent weight

In which of the following minimum amount of O_2 is required per gram of reactant?

A $P_4 + 5O_2 \rightarrow P_4O_{10}$

B $2Mg + O_2 \rightarrow 2MgO$

C $2Fe + 3O_2 \rightarrow 2FeO_3$

D $C_3H_8 + 5O \rightarrow 3CO_2 + 4H_2O$

Solution

Solution:- (B) $2Mg + O_2 \rightarrow 2MgO$

Per gram Mg, O_2 required = $\frac{1}{48}$ mole

#1612428

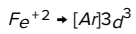
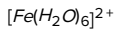
Topic: Crystal field theory

Find CFSE of $[Fe(H_2O)_6]^{2+}$ and $[NiCl_4]^{2-}$.

- A $-0.4\Delta_0$ and $-0.8\Delta_t$
- B $-0.4\Delta_0$ and $-1.6\Delta_t$
- C $-0.8\Delta_0$ and $-0.4\Delta_t$
- D $-1.2\Delta_0$ and $-1.2\Delta_t$

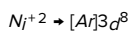
Solution

Solution:- (A) $-0.4\Delta_0$ and $-0.8\Delta_t$



$H_2O \rightarrow$ weak field ligand, so pairing so not take place $t_{2g}^{2,1,1}$

$$CFSE = -0.4 \times 4\Delta_0 + 0.6 \times 2\Delta_0 = -0.4\Delta_0$$



$Cl^- \rightarrow$ weak field ligand, so pairing do not take place and have tetrahedral geometry

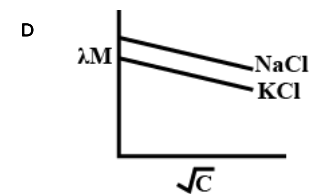
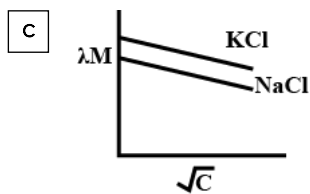
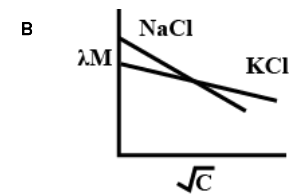
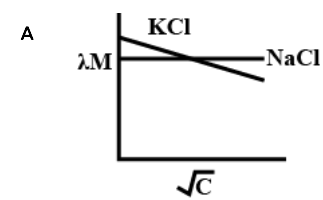


$$CFSE = -0.6 \times 4\Delta_t + 0.4 \times 4\Delta_t = -2.4\Delta_t + 1.6\Delta_t = -0.8\Delta_t$$

#1612429

Topic: Conductance of electrolytic solutions

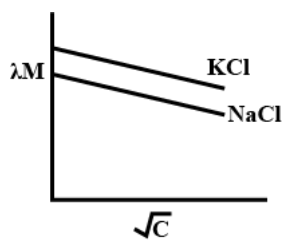
Which of the following graph is correct?



Solution

Solution:- (C)

Na^+ is more hydrated with respect to K^+ therefore KCl electrolyte have higher λ_M with respect to NaCl .



#1612430

Topic: Study of d-Block elements

The correct order of 1st ionisation enthalpy is :

- A $Ti < Mn < Zn < Ni$
- B $Ti < Mn < Ni < Zn$
- C $Mn < Ti < Zn < Ni$
- D $Zn < Ni < Mn < Ti$

Solution

Solution:- (A) Ti

Ionisation enthalpy

$Ti = 656$

$Mn = 717$

$Ni = 736$

$Zn = 906$ KJ/mole

Moving left to right

#1612444

Topic: Temperature, catalyst and activation energy of reactions

Rate constant for a reaction are 2.5×10^{-4} atm and 1 atm at temperature 327°C and 527°C respectively. Calculate activation energy in KJ. (Given $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$)

- A 166 KJ
- B -257 KJ
- C 120 KJ
- D 70 KJ

Solution

Solution:- (A) 166 KJ

$$\ln \frac{P_2}{P_1} = \frac{E_a}{R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

$T_1 = 600 \text{ K}$

$T_2 = 800 \text{ K}$

$P_1 = 2.5 \times 10^{-4}$

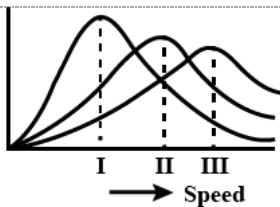
$P_2 = 1 \text{ atm}$

$$\ln \frac{1}{2.5 \times 10^{-4}} = \frac{E_a}{8.314} \left(\frac{1}{600} - \frac{1}{800} \right)$$

$E_a = 166 \text{ KJ}$

#1612453

Topic: Kinetic energy and molecular speeds



Graph I, II and III are respectively:

- A N_2 at 300K, H_2 at 300K, O_2 at 400K
- B O_2 at 400K, N_2 at 300K, H_2 at 300K
- C H_2 at 300K, N_2 at 300K, O_2 at 400K
- D N_2 at 300K, O_2 at 400K, H_2 at 300K

Solution

solution:- (D) N_2 at 300K, O_2 at 400K, H_2 at 300K

$$U_{mps} = \sqrt{\frac{2RT}{M}}$$

$$U_{mps} \propto \sqrt{\frac{T}{M}}$$

$$\text{for } N_2 \text{ at } 300K, U_{mps} \propto \sqrt{\frac{T}{M}} \propto \sqrt{\frac{300}{28}}$$

$$\text{for } O_2 \text{ at } 400K, U_{mps} \propto \sqrt{\frac{T}{M}} \propto \sqrt{\frac{400}{32}}$$

$$\text{For } H_2 \text{ at } 300K, U_{mps} \propto \sqrt{\frac{T}{M}} \propto \sqrt{\frac{300}{2}} = \sqrt{150}$$

#1612457

Topic: pH

p^H of 0.02M NH_4Cl solution is:

- A 5.35
- B 4.35
- C 9.65
- D 10.65

Solution

Solution:- (A) 5.35

$$p^H = 7 - \frac{1}{2}PK_b - \frac{1}{2}\log C$$

$$= 7 - \frac{5}{2} - \frac{1}{2}(\log 2 \times 10^{-2})$$

$$= 5.35$$

#1612460

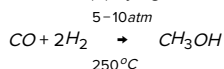
Topic: Carbon

The water gas when used for the formation of methanol is called:

- A Fuel gas
- B Syn gas
- C Natural gas
- D Producer gas

Solution

Solution:- (B) Syn gas



#1612464

Topic: Carbon

Which of the following is the correct order regarding catenation properly?

A $Si > C > S > P$

B $C > Si > P > S$

C $C > Si > S > P$

D $C > S > Si > P$

Solution

Solution:- (B) $C > Si > P > S$

The size of carbon atom is small and as a result, a strong C – C bond is formed. Hence, any number of carbon atoms can be linked to each other by covalent bonds.

As we move down the group the atomic size increases and the strength of bonds decreases. Therefore, down the group catenation power decreases.

#1612475

Topic: Colloidal state of matter

Which of the statement is correct?

A Brownian motion of colloidal particles does not depend on the size of particles

B Adsorption is endothermic process

C Colloidal medicines are better because of their small surface area.

D Electrophoresis can be used for ppt of lyophobic colloid

Solution

Solution:- (D) Electrophoresis can be used for ppt of lyophobic colloid

A. Brownian motion of colloidal particles depend on the size of particles

B. Adsorption is exothermic process

C. Colloidal medicines are better because of their large surface area.

D. Electrophoresis can be used for ppt of lyophobic colloid.