

Chemical Reactions JEE Main PYQ – 3

Total Time: 1 Hour

Total Marks: 100

Instructions

Instructions

1. Test will auto submit when the Time is up.
2. The Test comprises of multiple choice questions (MCQ) with one or more correct answers.
3. The clock in the top right corner will display the remaining time available for you to complete the examination.

Navigating & Answering a Question

1. The answer will be saved automatically upon clicking on an option amongst the given choices of answer.
2. To deselect your chosen answer, click on the clear response button.
3. The marking scheme will be displayed for each question on the top right corner of the test window.

Chemical Reactions

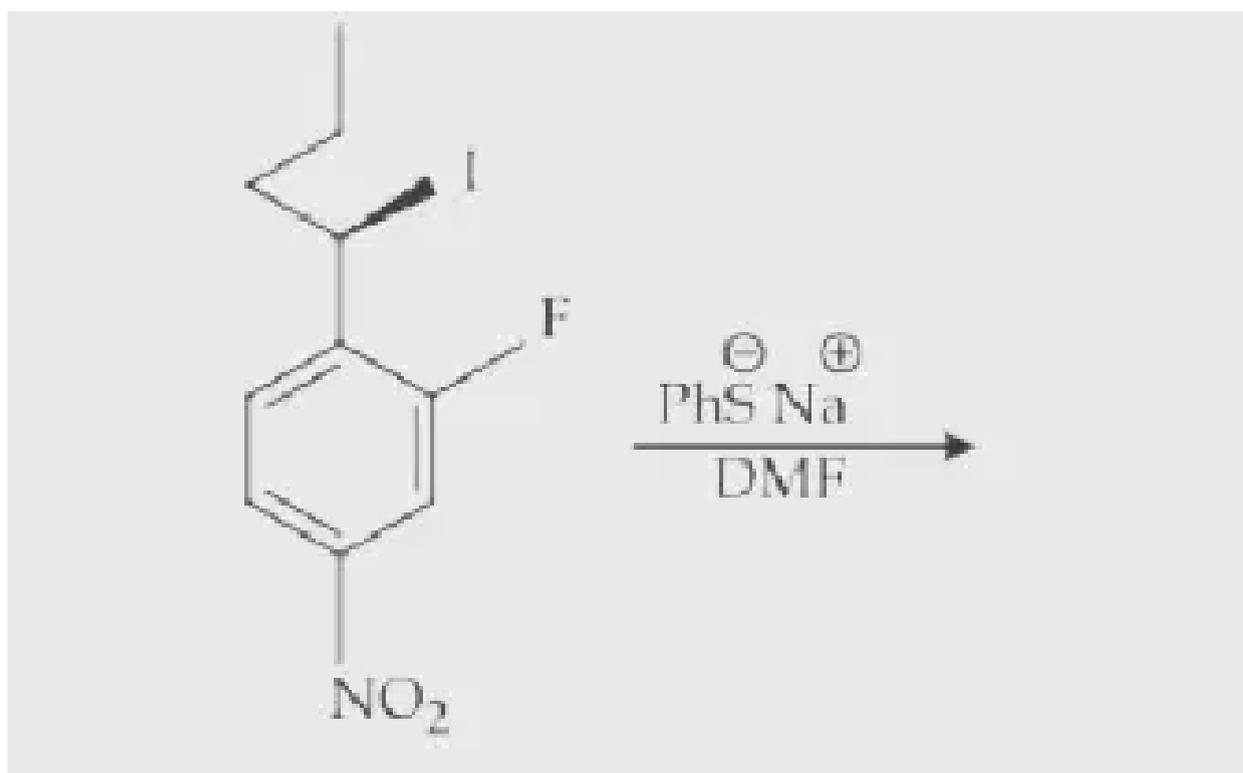
1. Arrange the following in the decreasing order of their covalent character : (+4, -1)

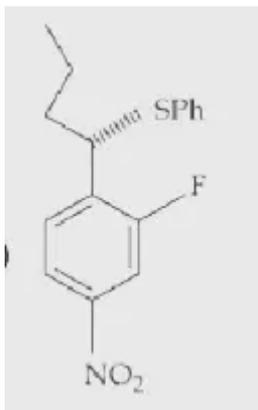
- (A) LiCl
- (B) NaCl
- (C) KCl
- (D) CsCl

Choose the most appropriate answer from the options given below :

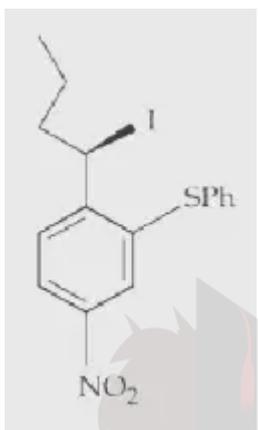
- a. (A) > (C) > (B) > (D)
- b. (B) > (A) > (C) > (D)
- c. (A) > (B) > (C) > (D)
- d. (A) > (B) > (D) > (C)

2. The major product of the following reaction is: (+4, -1)

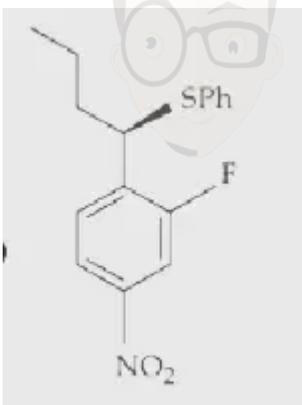




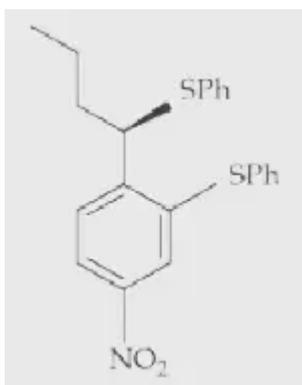
a.



b.



c.



d.

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3. Given below are two Statements:

(+4, -1)

Statement I: Classical smog occurs in cool humid climate. It is a reducing mixture of smoke, fog and sulphur dioxide.

Statement II: Photochemical smog has components, ozone, nitric oxide, acrolein, formaldehyde, PAN etc.

In the light of the above statements, choose the most appropriate answer from the options given below.

- a. Both Statement I and Statement II are correct.
- b. Both Statement I and Statement II are incorrect.
- c. Statement I is correct but Statement II is incorrect.
- d. Statement I is incorrect but Statement II is correct

4. Heating white phosphorus with conc. $NaOH$ solution gives mainly:

(+4, -1)

- a. Na_3P and H_2O
- b. H_3PO and NaH
- c. $P(OH)_3$ and NaH_2PO_4
- d. PH_3 and NaH_2PO_2

5. $BeCl_2$ reacts with $LiAlH_4$ to give:

(+4, -1)

- a. $Be + Li[AlCl_4] + H_2$
- b. $Be + AlH_3 + LiCl + HCl$
- c. $BeH_2 + LiCl + AlCl_3$
- d. $BeH_2 + Li[AlCl_4]$

6. Addition of H_2SO_4 to BaO_2 produces:

(+4, -1)

- a. BaO , SO_2 and H_2O

- b. $BaHSO_4$ and O_2
- c. $BaSO_4$, H_2 and O_2
- d. $BaSO_4$ and H_2O_2

7. Which of the following chemical reactions represents Hall-Heroult Process? (+4, -1)

- a. $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$
- b. $2Al_2O_3 + 3C \rightarrow 4Al + 3CO_2$
- c. $FeO + CO \rightarrow Fe + CO_2$
- d. $[2Au(CN)_2]^{-aq} + Zn(s) \rightarrow 2Au(s) + [Zn(CN_4)]^{2-}$

8. $\dot{C}l + CH_4 \rightarrow A + B$. A and B in the above atmospheric reaction step are (+4, -1)

- a. C_2H_6 and Cl_2
- b. $\dot{C}HCl_2$ and H_2
- c. $\dot{C}H_3$ and HCl
- d. C_2H_6 and HCl

9. The compound(s) that is(are) removed as slag during the extraction of copper is : (+4, -1)

1. CaO
2. FeO
3. Al_2O_3
4. ZnO
5. NiO

Choose the correct answer from the options given below :

- a. (3) (4) Only
- b. (1), (2), (5) Only

c. (1), (2) Only

d. (2) Only

10. An element 'X' on emitting an α -particle does not change its group number in the periodic table. The element is: (+4, -1)

a. (A) Radium

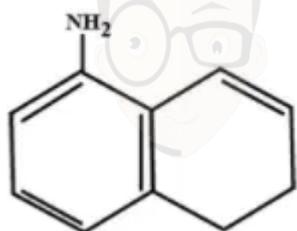
b. (B) Lanthanum

c. (C) Lawrencium

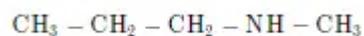
d. (D) Cerium

11. Which one of the following is a primary amine? (+4, -1)

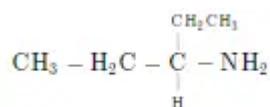
a. (A)



b. (B)



c. (C)



d. (D) Both A and C

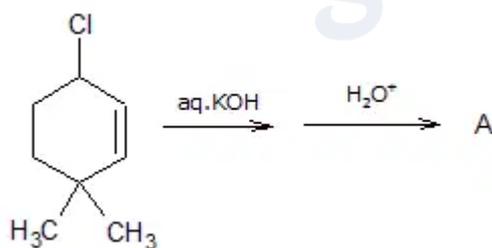
12. The reaction; $2\text{C}_2\text{H}_5\text{Cl} + 2\text{C}_2\text{H}_5\text{OH} \rightarrow 2\text{C}_2\text{H}_5\text{OC}_2\text{H}_5 + 2\text{HCl}$, shows an increase in concentration of $\text{C}_2\text{H}_5\text{Cl}$ by $20 \times 10^{-3} \text{ mol litre}^{-1}$ in 5 second. Calculate (a) rate of appearance of $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$ (b) rate of reaction and (c) rate of disappearance of $\text{C}_2\text{H}_5\text{OH}$. (+4, -1)

a. (A) $4 \times 10^{-3} \text{ mol litre}^{-1} \text{ sec}^{-1}$, $1 \times 10^{-3} \text{ sec}^{-1}$, $2 \times 10^{-3} \text{ litre}^{-1} \text{ sec}^{-1}$

b. (B) $2 \times 10^{-5} \text{ mol litre}^{-1} \text{ sec}^{-1}$, $1 \times 10^{-6} \text{ sec}^{-1}$, $1 \times 10^{-4} \text{ litre}^{-1} \text{ sec}^{-1}$

c. (C) $6 \times 10^{-5} \text{ mol litre}^{-1} \text{ sec}^{-1}$, $2 \times 10^{-6} \text{ sec}^{-1}$, $1 \times 10^{-4} \text{ litre}^{-1} \text{ sec}^{-1}$

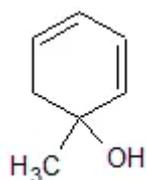
d. (D) $1 \times 10^{-5} \text{ mol litre}^{-1} \text{ sec}^{-1}$, $2 \times 10^{-6} \text{ sec}^{-1}$, $4 \times 10^{-4} \text{ litre}^{-1} \text{ sec}^{-1}$



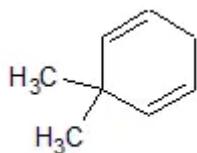
13. (+4, -1)

In the given reaction Product A is:

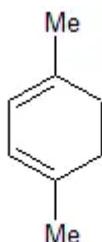
a. (A)



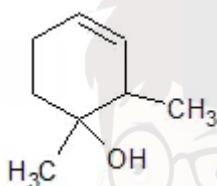
b. (B)



c. (C)



d. (D)

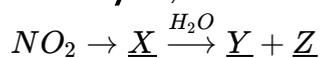


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14. Consider the following reaction sequence: $[CaCl_2 + Na_2CO_3 \rightarrow X + Y] \rightarrow Z$ (+4, -1)

- a. X: $CaCO_3$, Y: NaCl, Z: NCl
- b. X: CaO, Y: NaCl + CO_2 , Z: KCl
- c. X: CaO, Y: NaCl + CO_2 , Z: NaCl
- d. X: $CaCO_3$, Y: NaCl, Z: KCl

15. Identify X, Y and Z in the following reaction (Equation not balanced) $ClO +$ (+4, -1)



- a. $X = ClNO_3$, $Y = Cl_2$, $Z = NO_2$

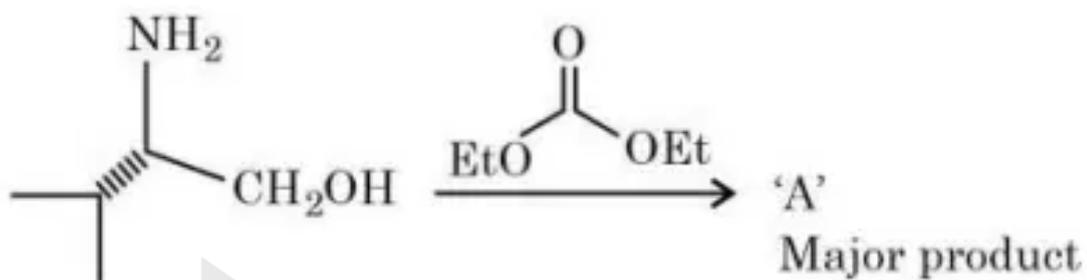
b. $X = ClONO_2, Y = HOCl, Z = HNO_3$

c. $X = ClONO_2, Y = HOCl, Z = NO_2$

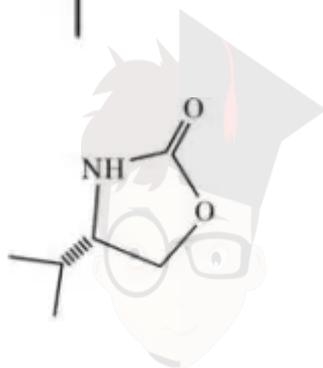
d. $X = ClNO_2, Y = HCl, Z = HNO_3$

16. In the following reaction, 'A' is

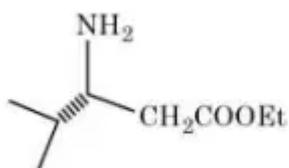
(+4, -1)



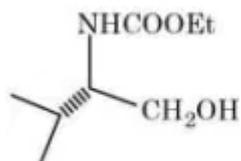
a.



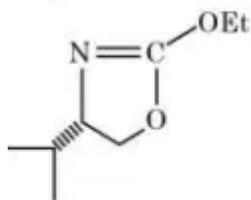
b.



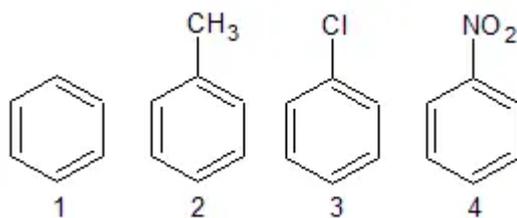
c.



d.



17. Identify the correct order of reactivity in electrophilic substitution reaction of the following compounds: (+4, -1)



- a. (A) $1 > 2 > 3 > 4$
- b. (B) $4 > 3 > 2 > 1$
- c. (C) $2 > 1 > 3 > 4$
- d. (D) $2 > 1 > 3 > 4$

18. In which of the following ionization processes the bond energy has increased and also the magnetic behaviour has changed from paramagnetic to diamagnetic? (+4, -1)

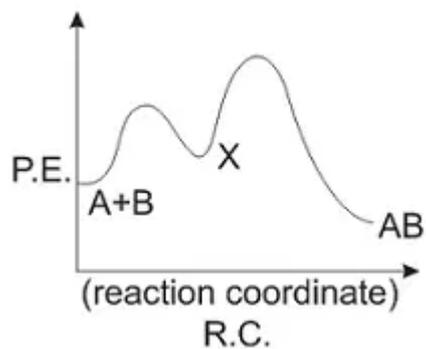
- a. (A) $\text{NO} \rightarrow \text{NO}^+$
- b. (B) $\text{N}_2 \rightarrow \text{N}_2^+$
- c. (C) $\text{C}_2 \rightarrow \text{C}_2^+$
- d. (D) $\text{O}_2 \rightarrow \text{O}_2^+$

19. When 0.6 g of urea dissolved in 100 g of water, the water will boil at (K_b for water = 0.52 kJ mol^{-1} and normal boiling point of water = $100 \text{ }^\circ\text{C}$): (+4, -1)

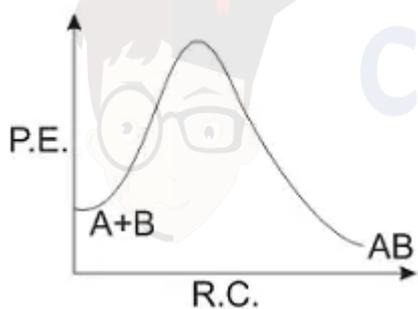
- a. (A) 373.052 K
- b. (B) 273.52 K
- c. (C) 372.48 K
- d. (D) 273.052 K

20. An exothermic chemical reaction occurs in two steps as follows: I. $A + B \rightarrow X$ (fast) II. $X \rightarrow AB$ (slow) The progress of the reaction can be best represented by:

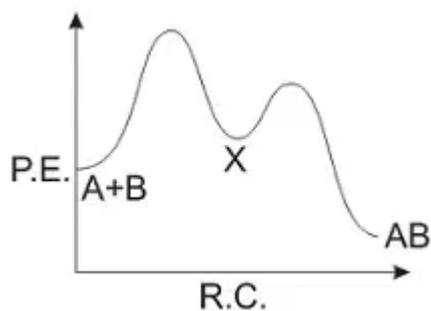
a. (A)



b. (B)



c. (C)



d. (D) None of the above

21. Chemical A is used for water softening to remove temporary hardness, A reacts with Na_2CO_3 to generate caustic soda. When CO_2 is bubbled through A, it turns cloudy. If the chemical formula of A is $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 \downarrow + \text{H}_2\text{O}$ then what is the value of ? **(+4, -1)**

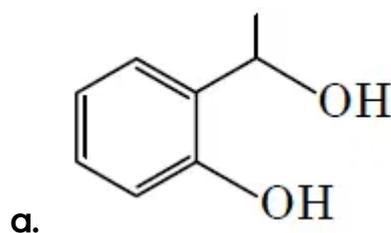
22. A solution of which of the following is needed to test the presence of proteins? **(+4, -1)**

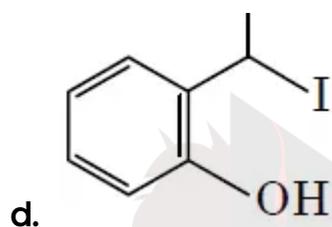
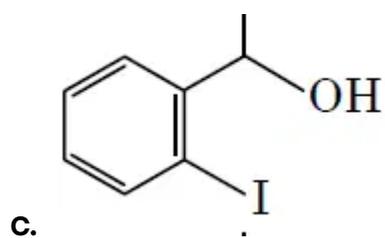
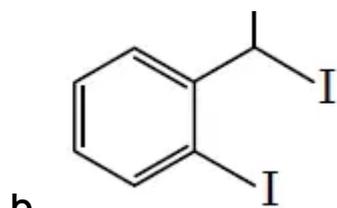
- a. (A) Copper sulphate and caustic soda solution
- b. (B) Iodine and caustic soda solution
- c. (C) Copper sulphate and iodine solution
- d. (D) Iodine solution

23. The order of reactivity of the given haloalkanes towards nucleophile is : **(+4, -1)**

- a. $\text{RI} > \text{RBr} > \text{RCl}$
- b. $\text{RCl} > \text{RBr} > \text{RI}$
- c. $\text{RBr} > \text{RCl} > \text{R}$
- d. $\text{RBr} > \text{RI} > \text{RCl}$

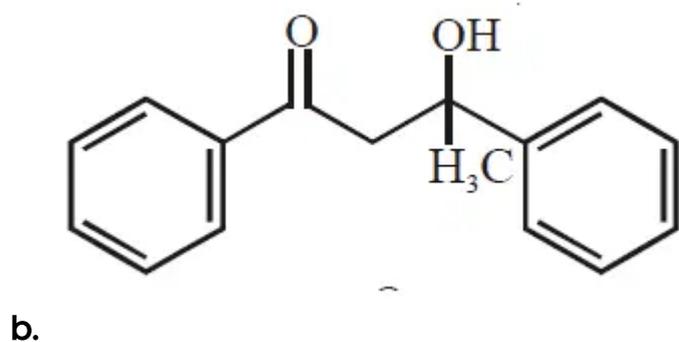
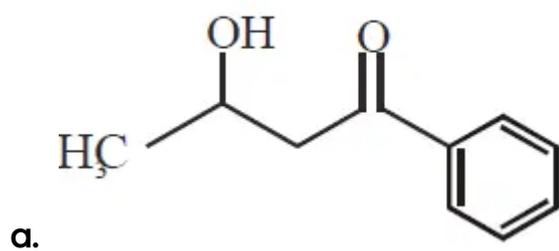
24. The major product formed in the following reaction is : **(+4, -1)**

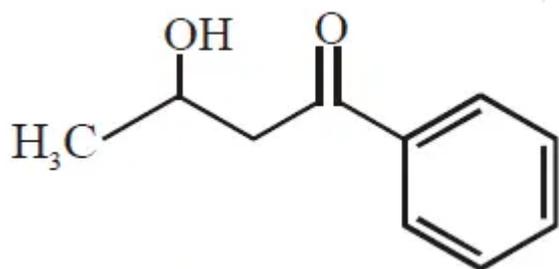




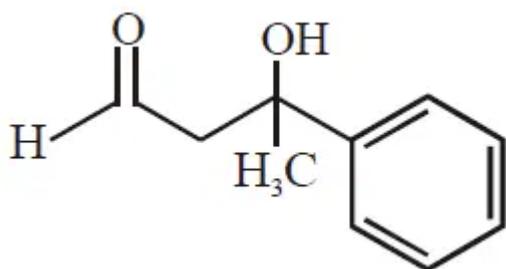
25. The major product formed in the following reaction is:

(+4, -1)





c.



d.



Answers

1. Answer: c

Explanation:

The correct option is (C): (A) > (B) > (C) > (D)

Covalent character \propto polarising power of cation

Correct decreasing order of covalent character

$\text{LiCl} > \text{NaCl} > \text{KCl} > \text{CsCl}$

Concepts:

1. Types of Differential Equations:

There are various types of Differential Equation, such as:

Ordinary Differential Equations:

Ordinary Differential Equations is an equation that indicates the relation of having one independent variable x , and one dependent variable y , along with some of its other derivatives.

$$F\left(\frac{dy}{dt}, y, t\right) = 0$$

Partial Differential Equations:

A partial differential equation is a type, in which the equation carries many unknown variables with their partial derivatives.

$$1. \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

$$2. u_{xx} + u_{yy} = 0$$

$$3. ux \frac{\partial^2 u}{\partial x^2} + u^2 xy \frac{\partial^2 u}{\partial x \partial y} + uy \frac{\partial^2 u}{\partial y^2} + \left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + u^3 = 0$$

$$4. \frac{\partial^2 u}{\partial x^2} + \left(\frac{\partial^2 u}{\partial x \partial y}\right)^2 + \frac{\partial^2 u}{\partial y^2} = x^2 + y^2$$

Linear Differential Equations:

It is the linear polynomial equation in which derivatives of different variables exist. Linear Partial Differential Equation derivatives are partial and function is dependent on the variable.

Linear Differential Equation in y

$$\frac{dy}{dx} + Py = Q$$

Linear Differential Equation in x

$$\frac{dx}{dy} + P_1x = Q_1$$

Homogeneous Differential Equations:

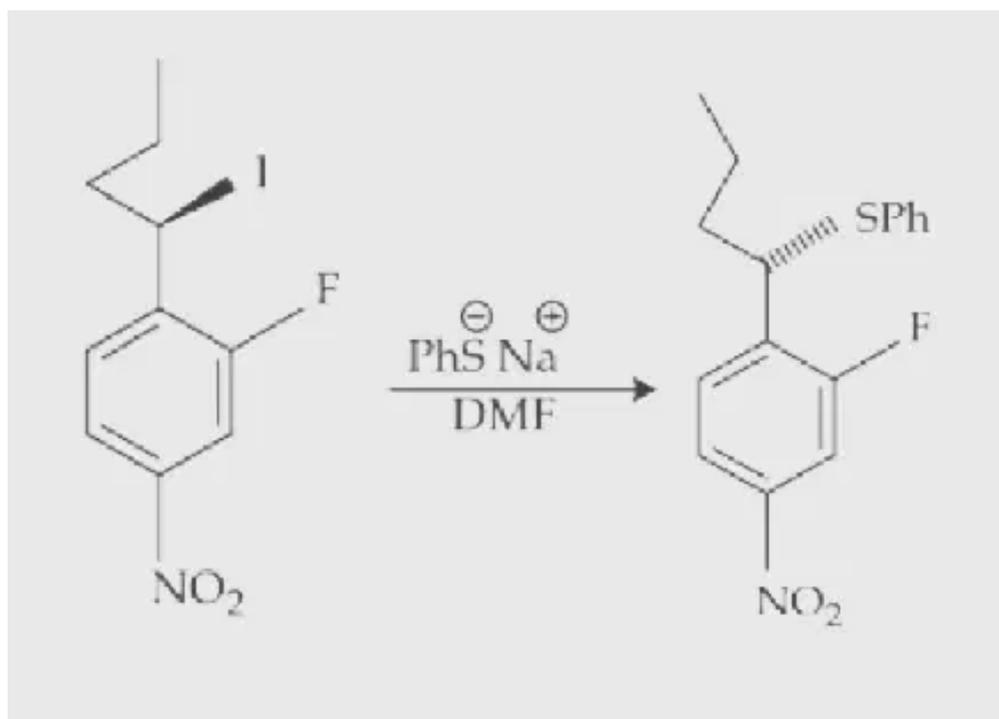
When the degree of $f(x,y)$ and $g(x,y)$ is the same, it is known to be a homogeneous differential equation.

$$\frac{dy}{dx} = \frac{a_1x + b_1y + c_1}{a_2x + b_2y + c_2}$$

Read More: [Differential Equations](#)

2. Answer: a

Explanation:



Concepts:

1. Alcohols, Phenols, and Ethers – Chemical Reactions:

The reaction of alcohols:

1. Reaction with Metal
2. Reaction with Halides
3. Reaction with HNO₃
4. Reaction with Carboxylic Acid (Esterification)
5. Dehydration of Alcohol
6. Haloform Reaction

The reaction of phenols:

1. Formation of Ester
2. Hydrogenation
3. Oxidation of Quinones
4. Electrophilic Substitution
5. Halogenation

The reaction of ethers:

1. Contact with Air
2. Halogenation of Ether
3. Electrophilic Substitution Reaction

Read More: [Alcohols, Phenols, and Ethers](#)

3. Answer: a

Explanation:

- (I) Classical smog occurs in cool humid climate.
It is a reducing mixture of smoke, fog and sulphur dioxide.
This is a **correct statement**.

(II) Photochemical smog has components, ozone, nitric oxide, acrolein, formaldehyde, PAN etc. is also based on fact and is a **correct statement**.

Hence, the correct option is (A): **Both Statement I and Statement II are correct**.

4. Answer: d

Explanation:

Heating white phosphorus with concentrated $NaOH$ solution results to the following reaction :



Hence, the correct option is (D): PH_3 and NaH_2PO_2

5. Answer: c

Explanation:

$BeCl_2$ reacts with $LiAlH_4$ to give the following chemical reaction



Concepts:

1. Haloalkanes and Haloarenes - Chemical Reactions:

Chemical Reactions go with the breaking and bonding of covalent bonds which involve of exchange of electrons. The functional groups of Organic compounds play a consequential role in the process. Based on the above theory, reactions can be classified into five main groups:

Rearrangement Reactions are the type of reactions in which products get formed simply by the rearrangement of atoms and electrons in the reactant molecules.

○

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Substitution Reactions are the reactions in which an atom or group of atoms is replaced by some other atom or group of atoms without any change in the structure of the remaining part of the molecule.

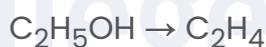


Addition Reactions are the reactions in which products get formed by the addition of some reagent to an unsaturated compound.



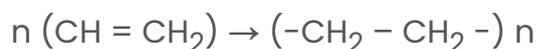
- Electrophilic Addition Reactions
- Nucleophilic Addition Reactions
- Free Radical Addition Reactions

Elimination Reactions are the reactions in which the products get formed by the loss of simple molecules like HX from the reactant molecules.



- $\text{E}_{\text{N}1}$ (Nucleophilic Elimination Unimolecular)
- $\text{E}_{\text{N}2}$ (Nucleophilic Elimination Bimolecular)

A polymerization Reaction is the union of two or more molecules of a substance that form a single molecule with higher molecular weight.



6. Answer: d

Explanation:

The reaction is as follows and will produce :

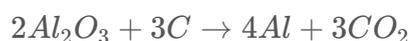


Hence, the correct option is (D): BaSO_4 and H_2O_2

7. Answer: b

Explanation:

Hall-Herault process is used for the extraction of aluminium by electrolysis molten Al_2O_3



8. Answer: c

Explanation:

The correct option is (C): CH_3 and HCl

Concepts:

1. Rate of a Chemical Reaction:

The [rate of a chemical reaction](#) is defined as the change in concentration of any one of the reactants or products per unit time.

Consider the reaction $A \rightarrow B$,

Rate of the reaction is given by,

$$\text{Rate} = -d[A]/dt = +d[B]/dt$$

Where, $[A]$ → concentration of reactant A

$[B]$ → concentration of product B

(-) A negative sign indicates a decrease in the concentration of A with time.

(+) A positive sign indicates an increase in the concentration of B with time.

Factors Determining the Rate of a Reaction:

There are certain factors that determine the rate of a reaction:

1. Temperature
 2. Catalyst
 3. Reactant Concentration
 4. Chemical nature of Reactant
 5. Reactant Subdivision rate
-

9. Answer: d

Explanation:

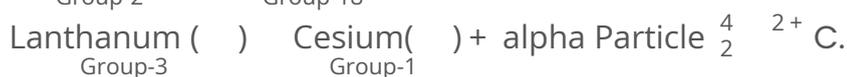
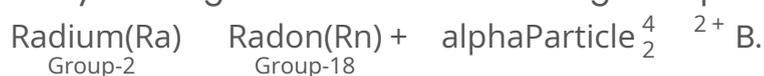
Therefore, the Correct option is (D) (2) Only.

10. Answer: c

Explanation:

Explanation:

Alpha particles are positively charged Helium nuclei, i.e. ${}^4_2\text{He}^{2+}$. If an alpha particle is emitted from reactant nuclei, the atomic number of new elements or daughter elements formed is decreased by 2 units and atomic weight is decreased by 4 units. Therefore, the position of the new element formed is displaced by two groups towards the left in the periodic table. This is called group displacement law. The decay of the given elements liberating an alpha particle is as follows:

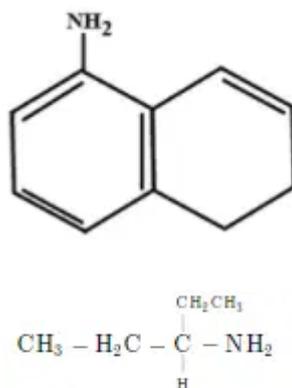


$\text{Cerium (Ce)}_{\text{Group-3}} \quad \text{Barium (Ba)}_{\text{Group-2}} + \text{alpha Particle } {}^4_2\text{He}^{2+}$ Therefore, the element Lawrencium does not change its group in the periodic table after emitting an alpha particle. Hence, the correct option is (C).

11. Answer: d

Explanation:

Explanation:



In a 1 degree amine, only 1 hydrogen atom of NH_3 is replaced by alkyl group. Primary amine have general formula $\text{R} - \text{NH}_2$ So, A is correct because 1 of the hydrogens has been replaced by the aryl group. Note that the kind of alkyl/aryl group does not matter in deciding the type of amine, what matters is the number of hydrogen replaced in NH_3 . Hence, the correct option is (D).

12. Answer: a

Explanation:

Explanation:

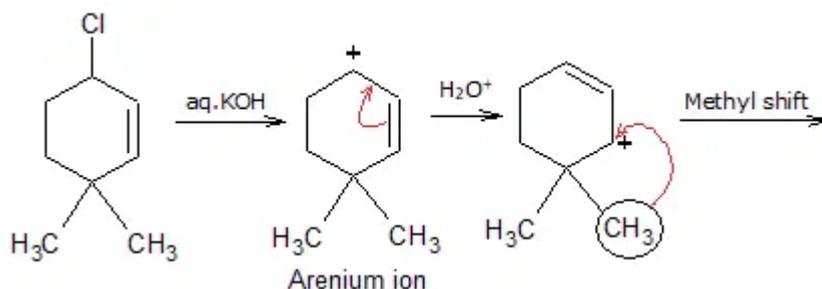
Increase in concentration of $\text{A} = 20 \times 10^{-3} \text{ mol litre}^{-1} = \frac{\Delta[\text{A}]}{\Delta t} = \frac{20 \times 10^{-3}}{5} = 4 \times 10^{-3} \text{ mol litre}^{-1} \text{ sec}^{-1}$ (b) Rate of reaction $= -\frac{1}{2} \frac{\Delta[\text{A}]}{\Delta t} = \frac{1}{4} \frac{\Delta[\text{A}]}{\Delta t} = \frac{\Delta[\text{A}]}{\Delta t} = \frac{1}{4} \times 4 \times 10^{-3} = 1 \times 10^{-3} \text{ sec}^{-1}$ (c) Rate of disappearance of $\text{B} = -\frac{\Delta[\text{B}]}{\Delta t} = \frac{1}{2} \frac{\Delta[\text{A}]}{\Delta t} = \frac{1}{2} \times 4 \times 10^{-3} = 2 \times 10^{-3} \text{ litre}^{-1} \text{ sec}^{-1}$ Hence, the correct option is (A).

13. Answer: d

Explanation:

Explanation:

When the given compound is treated with aqueous KOH , an arenium ion is formed, which is then rearranged (by methyl shift) to give a more stable tertiary carbocation and then nucleophile $-\text{OH}$ attacks on the carbonation. The reaction sequence is:

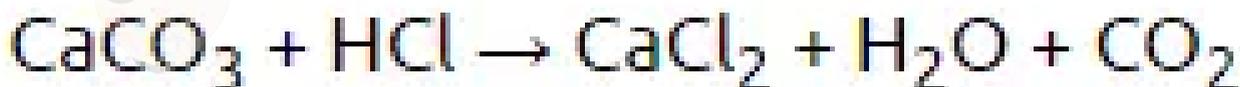


Hence, the correct option is (D).

14. Answer: a

Explanation:

The correct option is (A): X: CaCO_3 , Y: NaCl , Z: NaCl



Concepts:

1. Rate of a Chemical Reaction:

The [rate of a chemical reaction](#) is defined as the change in concentration of any one of the reactants or products per unit time.

Consider the reaction $A \rightarrow B$,

Rate of the reaction is given by,

$$\text{Rate} = -d[A]/dt = +d[B]/dt$$

Where, $[A] \rightarrow$ concentration of reactant A

$[B] \rightarrow$ concentration of product B

(-) A negative sign indicates a decrease in the concentration of A with time.

(+) A positive sign indicates an increase in the concentration of B with time.

Factors Determining the Rate of a Reaction:

There are certain factors that determine the rate of a reaction:

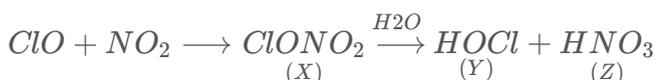
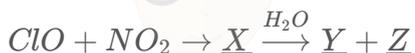
1. Temperature
2. Catalyst
3. Reactant Concentration
4. Chemical nature of Reactant
5. Reactant Subdivision rate

15. Answer: b

Explanation:

The correct option is (B): $X = ClONO_2, Y = HOCl, Z = NO$

The value of X, Y and Z in the given reaction is:



Concepts:

1. Rate of a Chemical Reaction:

The [rate of a chemical reaction](#) is defined as the change in concentration of any one of the reactants or products per unit time.

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Rate of the reaction is given by,

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Factors Determining the Rate of a Reaction:

There are certain factors that determine the rate of a reaction:

1. Temperature
2. Catalyst
3. Reactant Concentration
4. Chemical nature of Reactant
5. Reactant Subdivision rate

16. Answer: a

Explanation:

Analysis of the Given Reaction:

The given reaction involves a substitution of the hydroxyl group (-OH) with an ethyl carbamate (-COOEt) group to form the major product. The steps are as follows:

1. The compound $\text{NH}_2\text{-CH}_2\text{OH}$ reacts with ethyl chloroformate (EtO-C(=O)-Cl) under basic or catalytic conditions.
2. The primary amine group ($-\text{NH}_2$) undergoes nucleophilic attack on the carbonyl carbon of ethyl chloroformate, resulting in the formation of a carbamate group (NH-C(=O)OEt).

The major product, A, is NH-C(=O)OEt , as shown in **option (1)**.

Concepts:

1. Laws of Chemical Combination:

Basic Laws of Chemical Combinations:

The five basic [laws of chemical combination](#) for elements and compounds are given below.

Law of Conservation of Mass:

The Law of conservation of mass or the principle of mass conservation states that for any system closed to all transfers of matter and energy, the mass of the system must remain constant over time, as the system's mass cannot change, so the quantity can neither be added nor be removed.

Law of Definite Proportions:

The Law of definite proportions, sometimes called Proust's law, or the law of constant composition states that a given chemical compound always contains its component elements in a fixed ratio and does not depend on its source and method of preparation

Law of Multiple proportions:

The Law of multiple proportions states that if two elements form more than one compound, then the ratios of the masses of the second element which combine with a fixed mass of the first element will always be ratios of small whole numbers.

Gay Lussac's Law of Gaseous Volumes:

Gay Lusaacc's law of gaseous volume states that the pressure of a given mass of gas varies directly with the absolute temperature when the volume is kept constant.

Avogadro's Law:

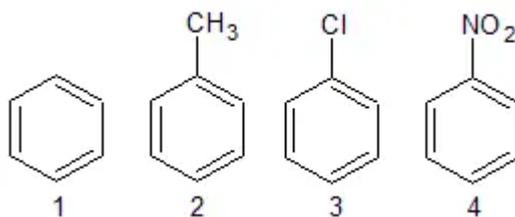
Avogadro-Ampère's hypothesis is an experimental gas law relating the volume of a gas to the amount of substance of gas present.

17. Answer: c

Explanation:

Explanation:

The given compounds are:



As we know, 1. An electron-donating group activates the benzene ring towards electrophilic substitution reactions. 2. An electron-withdrawing group deactivates the benzene ring for electrophilic substitution reaction. Now, i. Toluene, which has an electron-donating methyl group is more reactive than benzene towards electrophilic substitution. ii. Nitrobenzene and chlorobenzene are less reactive towards electrophilic substitution reactions than benzene as they have electron-withdrawing groups attached to them. iii. Nitro-benzene has a higher deactivating effect than Chloro-benzene. This is because the nitro group has an electron-withdrawing resonance effect and the Chloro group has an electron-withdrawing inductive effect. Resonance effect is stronger than inductive effect. Therefore, the order of reactivity is $2 > 1 > 3 > 4$. Hence, the correct option is (C).

18. Answer: a

Explanation:

Explanation:

Molecular orbital configuration of: (A) NO NO⁺

NO: $1^2 1^2 2^2 2^2 2^2 2^2 2^2 2^2 2$ Paramagnetic Bond order

$= \frac{10-5}{2} = 2.5$ NO⁺: $1^2 1^2 2^2 2^2 2^2 2^2 2^2 2^2$ Diamagnetic Bond order

$= \frac{10-4}{2} = 3$ (B) N₂ N₂⁺ N₂: $1^2 1^2 2^2 2^2 2^2 2^2 2^2 2^2$ Paramagnetic Bond

order $= \frac{10-4}{2} = 3$ N₂⁺: $1^2 1^2 2^2 2^2 2^2 2^2 2^1$ Paramagnetic Bond order

$= \frac{9-4}{2} = 2.5$ (C) C₂ C₂⁺ C₂: $1^2 1^2 2^2 2^2 2^2 2^2$ Diamagnetic Bond order

$= \frac{8-4}{2} = 2$ C₂⁺: $1^2 1^2 2^2 2^2 2^2 2^1$ Paramagnetic Bond order $= \frac{7-4}{2} = 1.5$

(D) O₂ O₂⁺ O₂: $1^2 1^2 2^2 2^2 2^2 2^2 2^2 2^1 2$

Paramagnetic Bond order $= \frac{10-6}{2} = 2$ O₂⁺: $1^2 1^2 2^2 2^2 2^2 2^2 2^2 2^1$

Paramagnetic Bond order $= \frac{10-5}{2} = 2.5$ Hence, the correct option is (A).

19. Answer: a

Explanation:

Explanation:

Mass of the urea = 0.6 g
 Mass of the water = 100 g = 0.1 kg
 Molality of the solution

$$= \frac{0.6}{60} / \frac{1}{1000} \times 0.1 = 0.1$$
 Elevation in boiling point = Δ

$$= \frac{0.52}{1000} \times 0.1 = 0.052$$
 The boiling point of pure water = 373 K

$$\Delta = 373 + 0.052 = 373.052$$
 The boiling point of the solution is 373.052.
 Hence, the correct option is (A).

20. Answer: c

Explanation:

Explanation:

The reaction occurring in two steps has two activation energy peaks. The first step being fast needs less activation energy. The second step being slow needs more activation energy. Therefore, the second peak will be higher than the first. Hence, the correct option is (C).

21. Answer: 3 - 3

Explanation:

Explanation:

The chemical is calcium hydroxide (Ca(OH)_2). It is used for water softening to remove temporary hardness. It reacts with sodium carbonate to form caustic soda.

$$2\text{Na}_2\text{CO}_3 + \text{Ca(OH)}_2 \rightarrow 2\text{NaOH} + \text{CaCO}_3$$
 With carbon dioxide gas, it forms calcium carbonate which turns lime water milky.

$$\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$$
 Hence, the correct answer is 3.

22. Answer: a

Explanation:

Explanation:

Copper Sulphate and caustic soda solution are used to test the presence of

proteins. The biuret test is used to confirm the presence of proteins in food materials. If the mixture turns violet colour that indicates the presence of proteins in the food. Other tests for protein detection are: Xanthoproteic test. Millon's test. Ninhydrin test. Caustic soda is also known as Sodium hydroxide. Formula: NaOH. Sodium hydroxide is used in the manufacture of pulp and paper, soaps, and detergents. Copper Sulphate is also called blue vitriol. Formula: CuSO₄. It is used as an analytical reagent. Hence, the correct option is (A).

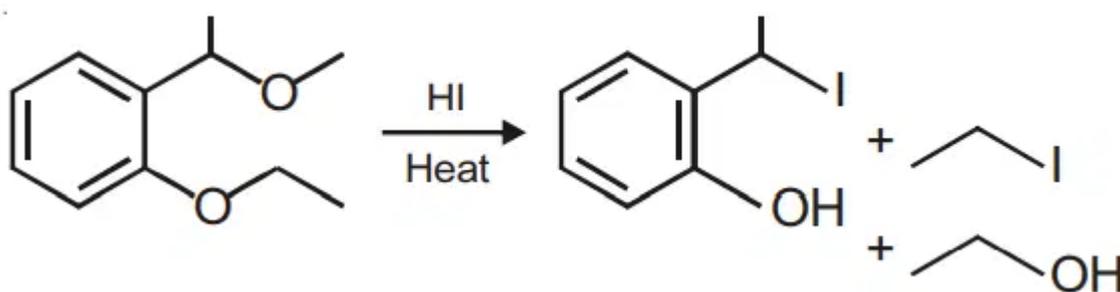
23. Answer: a

Explanation:

For a given alkyl group, the order of reactivity is $\frac{R-F > R-Cl > R-Br > R-I}{\text{increasing bond energy}}$ decreasing halogen reactivity. This order depends on the carbon-halogen bond energy; the carbon-fluorine bond energy is maximum and thus fluorides are least reactive while carbon-iodine bond energy is minimum hence iodides are most reactive.

24. Answer: d

Explanation:



25. Answer: a

Explanation:

Aldehyde reacts at a faster rate than ketone during aldol condensation and sterically less hindered anion will be a better nucleophile so self aldol condensation will be the major product.