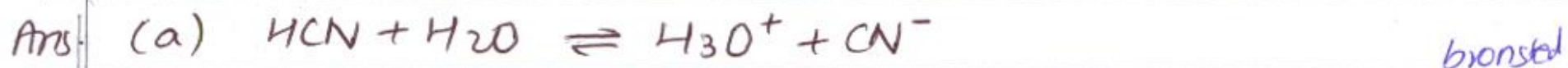


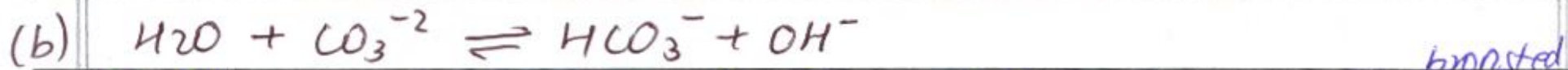
Q. No. 2 Part (ii) Identify Bronsted acids and bases.



• **Acid:** HCN donates a proton to H_2O to become CN^- . It is acid.

• **Base:** H_2O accepts proton (H^+) from HCN to become H_3O^+ .

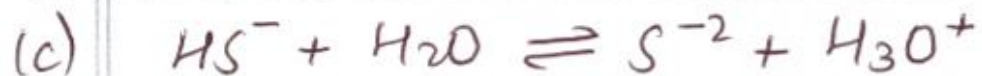
It is Bronsted base.



• **Acid:** H_2O donates a proton to CO_3^{2-} to become OH^- . It is acid.

• **Base:** CO_3^{2-} accepts proton from H_2O to form HCO_3^- . It is

base.



• **Acid:** HS^- donates proton to H_2O to form S^{2-} . It is an acid.

• **Base:** H_2O accepts proton from HS^- to form H_3O^+ . It is

Bronsted base.

.....

Q. No. 2 Part (iii) Calcium carbonate is made by reaction of calcium hydroxide Ca(OH)_2 with carbonic acid. Write down balanced equation.

Ans • **Chemical equation:**

Calcium hydroxide + carbonic acid \longrightarrow calcium carbonate



Calcium hydroxide and carbonic acid give calcium carbonate and two moles of water on reaction.

Q. No. 2 Part (iv) Identify and encircle functional group with names.

Ans. (a) $\text{CH}_3 - \text{C} \equiv \text{CH}$

• **F. Group:** $\text{CH}_3 - \text{C} \equiv \text{CH}$.

A triple bond is present, hence it is an alkyne.

• **Name:** Propyne (3 carbon atoms)

(b) $\text{CH}_3\text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{H}$

• **Functional Group:** $\text{CH}_3\text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{H}$

Formyl group is present, it is an aldehyde.

• **Name:** Propanal

(c) $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_3$

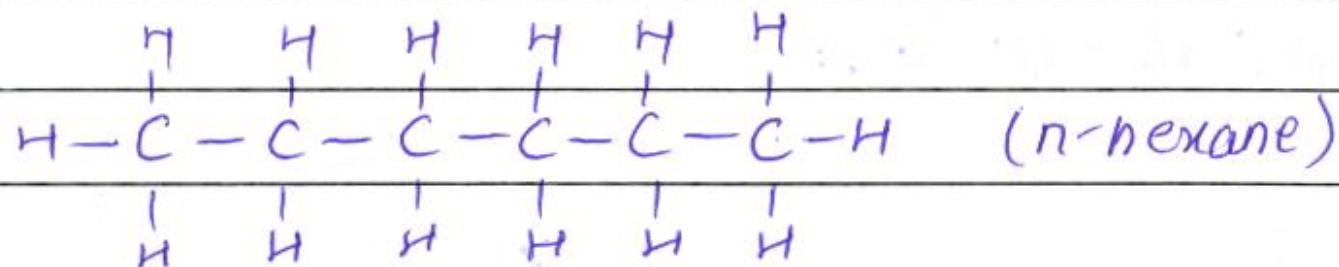
• **Functional Group:** $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_3$

oxygen is attached with 2 alkyl groups, it is an ether.

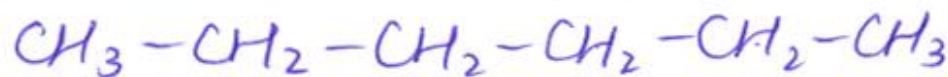
• **Name:** ethyl methyl ether.

Q. No. 2 Part (v) Predict molecular, structural, and condensed formula for hexane.

Ans. • **Structural formula:** It shows arrangement of atoms.



• **Condensed formula:** It uses abbreviation for various groups in chain.

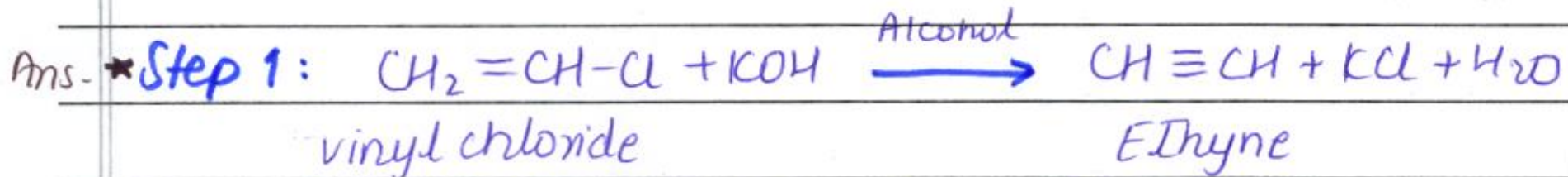
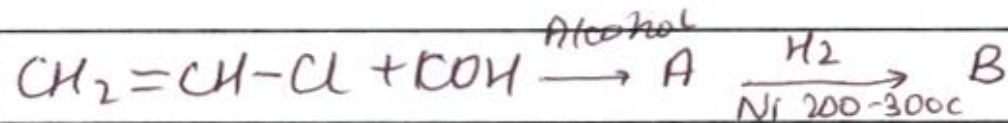


• **molecular formula:** Hexane is an alkane so,

$$= \text{C}_n \text{H}_{2n+2} \Rightarrow \text{C}_6 \text{H}_{2(6)+2}$$

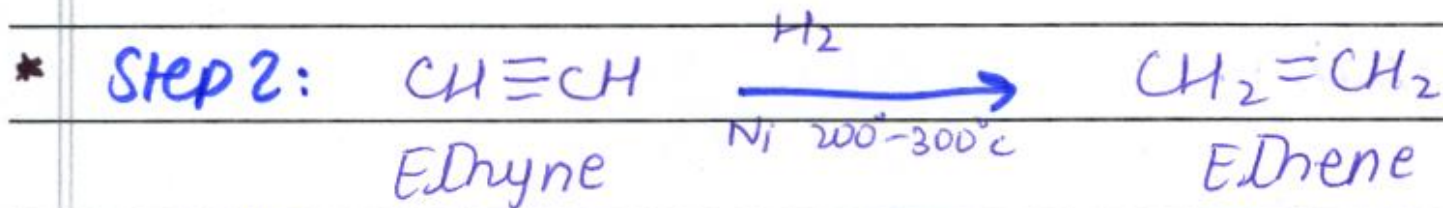
$$= \text{C}_6 \text{H}_{14}$$

Q. No. 2 Part (vii) Identify A and B in this reaction.



- Removal of hydrogen halide forms ethyne.

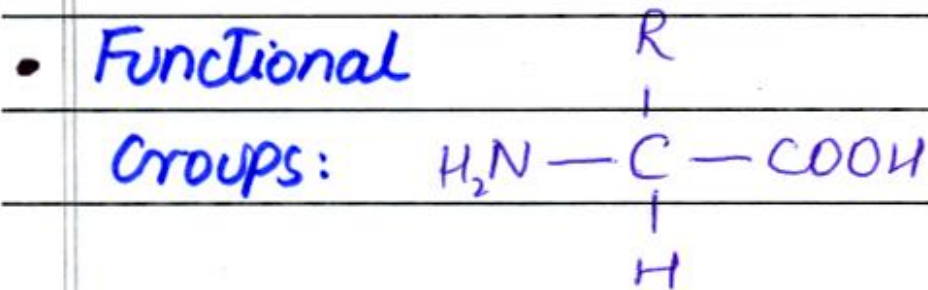
A: Ethyne



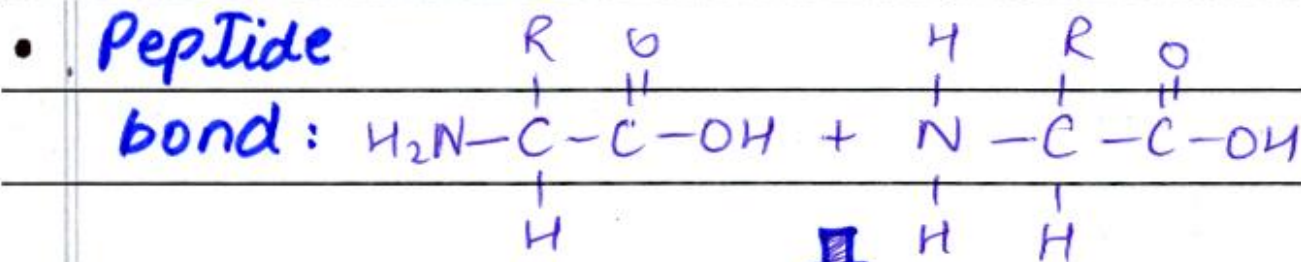
- Addition of one mole of H_2 across triple bond forms ethene.
- B:** Ethene.

Q. No. 2 Part (ix) Identify functional groups in amino acids.
 Draw a peptide linkage between two amino acids.

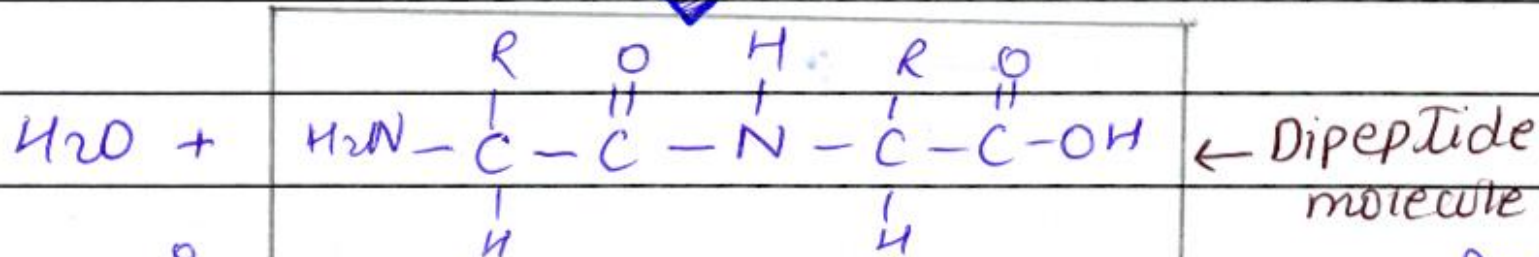
Ans.



An amino acid contains carboxylic acid & amine group.



Two amino acids eliminate H_2O to form dipeptide.



The $C(=O)-NH$ linkage between two amino acids is peptide bond.

Q. No. 2 Part (xi) What is meant by greenhouse gases? What is their role in global warming.

Ans. • **Greenhouse gases**: Greenhouse gases are present in our atmosphere. When sunlight strikes the earth's surface, some infra-red rays are re-emitted by earth. These gases trap this energy. It is energy distribution mechanism of earth.

Examples: CO_2 , methane, chlorofluorocarbons etc.

• **Global warming**: The increasing temperature of earth due to our influence is called global warming. When greenhouse gases are concentrated in atmosphere (due to human activities), they trap more heat and make the atmosphere hotter. It is causing climate change.

Q. No. 2 Part (xii) Density of most liquids decreases on heating and increases on cooling. Water shows strange behavior. Discuss.

Ans. • **Water's density:**

Water shows strange behavior in regard of density.

When it is cooled, it contracts up to 4°C . Water reaches maximum density at 4°C . On further cooling, it expands and its density decreases. Thus, it expands on freezing (at 0°C).

• **Uses of water's strange behavior:**

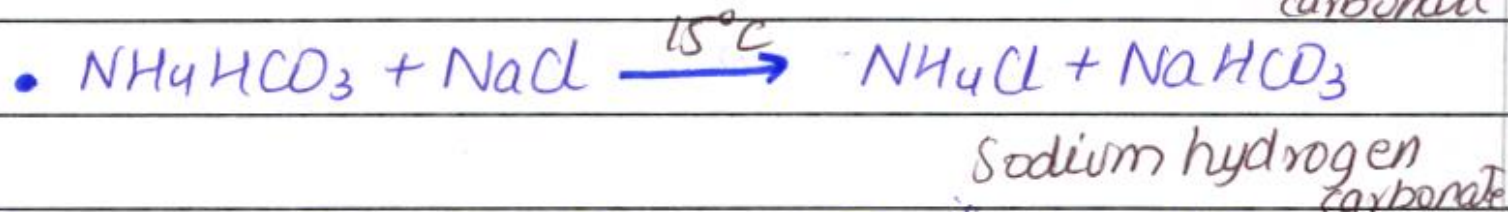
Ice is 9% less dense than water. Ice floats on top of water and insulates lower levels of water. This helps aquatic organisms survive in winter. Otherwise, the whole water body would freeze in winter.

Q. No. 2 Part (xiii) How does CO_2 react with ammonical brine in Solvay's process? Write down reactions.

Ans. Ammonical brine is prepared by adding NH_3 gas in brine. It is fed into carbonating tower.

• Carbonating Tower:

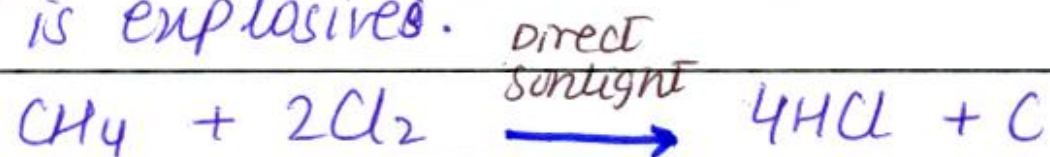
In carbonating tower, CO_2 gas is passed through ammonical brine.



• In lower compartments, temperature is reduced to 15°C and NaHCO_3 precipitates out. It is later heated to form Na_2CO_3 (soda ash).

Q. No. 2 Part (xv) How does methane react with chlorine in direct sunlight? write trends in —

Ans. • **Sunlight:** Reaction of methane and chlorine in direct sunlight is explosive.



In diffused sunlight, alkanes undergo substitution reaction.

- **Trends in reactivity:** $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$ (with alkanes)
- **Fluorine:** Fluorine is most reactive. It reacts explosively.
- **Chlorine:** Chlorine reacts slowly in dark at room temperature but rapidly in strong sunlight.
- **Bromine:** Bromine is less reactive than chlorine. It reacts rapidly in high temperature & strong sunlight but slowly in dark.
- **Iodine:** Iodine is essentially unreactive.

.....
Q. No. 2 Part (xiv) Describe following terms.

- **Petroleum:** Petroleum or crude oil is thick dark viscous liquid which seeps from earth crust. It is made from fossil fuels buried under land for millions of years. Absence of air, heat & pressure of sediments convert matter into petroleum. [Petra (rock) and oleum (oil)]. Natural gas accumulates over crude oil.
- **Fractional distillation:** It is the process of converting liquid hydrocarbon mixture into useful products (fractions) by passing its vapor in fractional distillation column. Different fractions condense according to their boiling points (High B.P → near bottom, low B.P → near top)
- Fractional distillation of petroleum produces LPGs, Gasoline, Naphtha, kerosene, Diesel, lubricating oil, fuel oil & bitumen.

Q. No. 3 Part (a) (Page 1/2) Explain manufacturing of urea in two steps. Also write its uses.

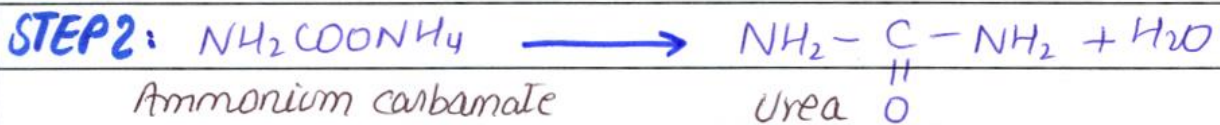
Ans. * **Manufacturing of urea:**

• **Raw materials:**

The raw materials used for manufacturing of urea are:

- 1- Carbondioxide (CO_2)_g
- 2- Ammonia (NH_3)_l

• **Reactions:**



- Distillation of ammonium carbamate produces urea solution. Urea solution is granulated.
- Urea solution is then concentrated in vacuum evaporators and after cooling sent to prilling tower.
- Urea prills are packed and marketed.

* **Uses of urea:**

- **Nitrogen:** Urea has the highest nitrogen percentage among all synthetic fertilizers. i.e. 46.6%.
- **Texture:** It does not affect the texture of soil.
- **Fertilizer:** Urea prills take very less time to dissolve in water.

• Beneficial for crops:

- In water, urea hydrolyses to form ammonium carbamate which is converted into NH_3 .
- Ammonia (NH_3) decomposes to form N_2 and H_2 .
- Nitrogen is necessary for plant development.
- It increases crop yield, imparts green color to plants and is needed by stems & leaves.

Q. No.3 Part (b) (Page 1/2) What is meant by Lewis acid and Lewis base- Classify following $AlCl_3$, CN^- , H_3O^+ , NH_3

Ans. In 1923, Gilbert Newton Lewis proposed acid-base Theory.

• **Lewis acid:**

- Lewis acid is a substance that accepts pair of electron to form co-ordinate covalent bond.
- It is electron-deficient.
- It includes cations mostly.

• **Lewis base:**

- Lewis base is a substance that donates pair of electron to form co-ordinate covalent bond.
- It has complete octet and lone pairs.
- It includes anions mostly.

* **Classification:**

1- $AlCl_3$

Acid: It is a Lewis acid because aluminium is electron deficient due to electronegative chlorine. It accepts electron pair.

2- CN^-

Base: It is a Lewis base because it has lone pair. It donates electron pair.

3. H_3O^+

Acid: It is Lewis acid because it is electron deficient
It accepts electron pair.

4. NH_3

Base: It is Lewis base because it has lone pair.
It donates electron pair.

space for diagram
(Section C)

Q. No. Part ()



space for diagram
(Section C)

Q. No. Part ()



Q. No. 4 Part (a) (Page 1/2) Describe methods To remove Temporary hardness.

Ans. • **Temporary hardness:**

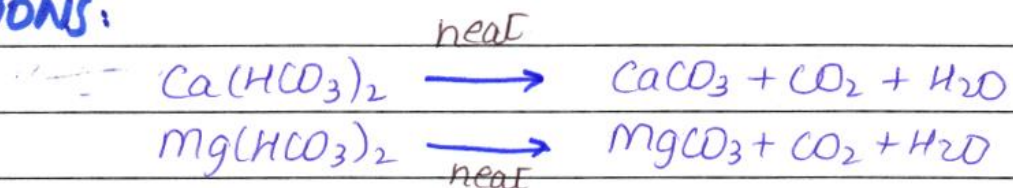
- Hard water whose hardness can be removed by boiling is called temporary hard water.
- Hardness is due to presence of calcium or magnesium hydrogen carbonates in water.

* **METHODS TO REMOVE HARDNESS:-**

1) **Boiling of water:**

- Temporary hardness can be simply removed by boiling the water.
- Insoluble calcium and magnesium hydrogen carbonates are converted into their soluble carbonates.
- Thus, water becomes soft.
- However, this method is too expensive to remove temporary hardness on large scale.

• **REACTIONS:**



2) **Adding slaked lime (Clark's method):**

- Temporary hardness on large-scale can be removed by adding an estimated amount of slaked lime $(\text{CaOH})_2$.
- Slaked lime reacts with calcium and magnesium

hydrogen carbonates.

- They are converted into their soluble carbonates.
- Thus, water becomes soft.

• **REACTIONS:**



Q. No.4 Part (b) (Page 1/2) Enlist names of atmospheric layers.
Explain first two layers closest to earth.

Ans • **Atmosphere:** The envelope of gases and water vapor surrounding earth is called atmosphere.

• **Layers of atmosphere:**

There are four layers in atmosphere.

- Troposphere [0-12 km, 17°C to -55°C]
- Stratosphere [12-50 km, -55°C to -5°C]
- Mesosphere [50-80 km, -5°C to -93°C]
- Thermosphere [Above 80 km, 1800°C]
 - ↳ Ionosphere [80-400 km]
 - ↳ Exosphere [Above 400 km]

• The two layers closest to earth are troposphere and stratosphere.

1) **Troposphere:** Tropo means changing, or turning

• Troposphere is the first layer closest to Earth's surface.

• **Altitude:** It extends up to 12 km from earth's surface.

• **Temperature:** The lower troposphere has 17°C temperature. It decreases with altitude. For 1 km increase in altitude, temperature decreases by 6.5°C. Upper troposphere has temperature -55°C.

• **Composition:** The conditions in troposphere vary.

◦ It contains 75-80% mass of atmosphere.

◦ Weather occurs in this layer.

- It contains most of the water vapor and dust.
- We live in this layer.
- ~~The~~ planes fly in this layer.
- Most clouds form in this layer.

2) **Stratosphere**. Strato: means layer or spread out.

- Stratosphere is the second most layer close to earth's surface.
- Altitude: Stratosphere rises from the top of troposphere to 50 km above earth's surface.
- Temperature: Lower stratosphere is cold at -55°C . However upper stratosphere is warmer at -5°C .
- Composition:
 - Stratosphere contains little water vapor.
 - It contains maximum ozone (10 parts per million).
 - Ozone absorbs ultra violet radiations from sun and gives out heat energy.
 - This increases the temperature of this layer.
 - If UV radiations are not filtered out by ozone, they can cause damage to humans, plants, and animals.
 - UV radiations damage immune system, cause gene mutation & eye cataracts.

Space for diagram
(Section C)

Q. No. Part ()

Handwritten text, possibly a question number or part identifier, located in the upper right quadrant of the page.

Space for diagram
(Section C)

Q. No. Part ()

Handwritten text, possibly a question number or part identifier, located in the upper right quadrant of the page.