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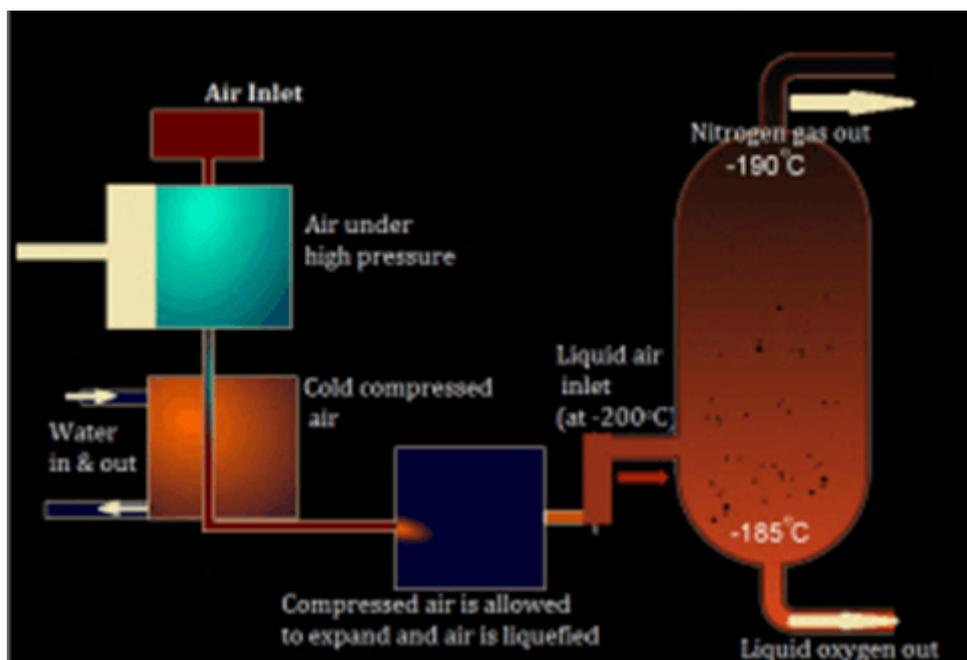
Separation Techniques-Obtaining Gases from Air, Questions (For CBSE, ICSE, IAS, NET, NRA 2022)

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- Mixtures are substances consisting of two or more types of matter. Mixtures are two types – homogeneous mixture and heterogeneous mixture. In a heterogeneous mixture, the components are not uniformly distributed and there is no particle level homogeneity. Thus, we can easily separate a heterogeneous mixture into respective components of the mixture.
- Sieving, filtration, handpicking, etc. are few common separation techniques used for the heterogeneous mixture. In the case of the homogeneous mixture and sometimes a heterogeneous mixture, we need to use special separation techniques. Evaporation, centrifugation, chromatography, sublimation, separating funnel, etc. are special separation techniques.

Separation Techniques: Obtaining Gases from Air

- We know that air is a homogeneous mixture of gases. It constitutes of gases like nitrogen, oxygen, carbon dioxide, argon, etc. in different proportion. Since it is a homogeneous mixture, we need special separation techniques. Fractional distillation is the technique that is used for obtaining different components from the air.
- Fractional distillation is a separation method where the difference in boiling points of components is used to separate the liquid mixture into fractions through distillation. The process begins with the liquefaction of air.
- In order to obtain nitrogen gas from air, we need to remove rest of the constituents of air. Before we start, air is filtered to remove the dust particles and then liquefied.



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Separation Techniques-Obtaining gases from Air

Step 1: Conversion of Air into Liquid Air

The air which is in gaseous form is converted into liquid air. This is done under high pressure. Under high pressure, the air is compressed and then cooled by reducing the temperature. This results in liquid air.

Step 2: Fractional Distillation

- The liquid air is then passed through the fractional distillation column. Here, the liquid air is allowed to warm-up. The bottom of the fractionating column is warmer than the top. Each gas starts to separate at different temperatures according to its boiling point.
- Nitrogen has a boiling point of -196°C while oxygen has -183°C . The nitrogen gas will start to escape through the outlet and it is collected. The liquid oxygen will be collected in the fractionating column.

Questions

How Do You Separate Gas and Gas Mixture?

Answer:

The process of re-distillation is often called double distillation. Reverse process can be used to separate gases by cooling the gas until the individual gas components condensate into a liquid.

How Do We Get Gas from Air?

Answer:

To Obtain Different Gases from Air. Air can be separated into components by fractional distillation. The below flow diagram shows the steps of the process in the separation of components of air. To separate the oxygen gas present in air, all the other gases present in the air should be separated.

What Are Gas Separation Technologies Used For?

Answer:

Gas separation is a technique used to split up gases, either to separate and purify multiple or single gas components. Axiom's separation technology is based upon polymer membranes.

How Do We Separate Oxygen from Air?

Answer:

The liquid nitrogen and oxygen are then separated by fractional distillation. The liquefied air is passed into the bottom of a fractionating column.

Draw the Flow Chart for Obtaining Different Gases from Air

Answer:

Air

↓

Compress and cool by increasing pressure & decreasing temperature.

Liquid Air

↓

Allow to warm up slowly in fractional distillation column.

↓

Gases get separated at different heights.

↓

| | | |
|--------|-------|------------------------|
| Oxygen | Argon | Nitrogen |
| -183 | -186 | -196 (Boiling point) |
| 20.9 | 0.9 | 78.1 (% air by volume) |