Oxygen and hydrogen production

CECA's molecular sieves for industrial gases solutions

Hydrogen purification by Pressure Swing Adsorption (PSA)

The PSA process involves the **removal of impurities** from a hydrogen rich feed gas by running the gas at high pressure through a fixed bed packed with different adsorbents. The impurities are subsequently desorbed at low pressure as an off-gas stream. Products can become **99.999% pure**.

Various hydrogen rich feedstocks can be treated, including steam reformer gases, methanol and ammonia off-gases, refinery gases, ethylene cracker gases, coke oven gases, etc.

Main consumers of purified hydrogen are refineries (cracking, desulphurization and dearomatization processes) and the petrochemical industry (methanol and ammonia synthesis, MTBE processes, etc.).

High performance and dependable Siliporite® molecular sieves are the best product for this application.

Oxygen production by Pressure Swing Adsorption (PSA)

Oxygen is traditionally produced by cryogenic distillation, which is a capital intensive process economical for large volume plants. The adsorption process, widely called PSA, can be used to **generate oxygen** and is **very attractive** and **more competitive** than the cryogenic process for small oxygen production. Another advantage is that it **can be used in remote locations** which are not connected to an oxygen grid.

In this process, air is passed through at least one column where components like nitrogen (N_2), carbon dioxide (CO_2) and water (H_2O) are better adsorbed than oxygen (O_2) and argon (Ar). The **oxygen produced can reach a purity level of 90% or more**.

CECA has developed several products under the Airsiev® brand to supply the oxygen PSA industry.

Air prepurification for cryogenic distillation

With cryogenic distillation, gases are separated at extremely low temperature.

In a modern Air Separation Unit (ASU), the first step is to remove water, carbon dioxide, nitrogen oxide and traces of hydrocarbons using an adsorption process, based on molecular sieves such as CECA's Airsiev® products and in some cases activated alumina.

Downstream, the air is processed in a cryogenic distillation column in order to produce highly pure nitrogen (N_2), oxygen (O_2) and argon (Ar). Purity levels can reach: O_2>99.95% and N_2>99.999 %. The molecular sieves unit is a very critical step of the process and has to be well designed in order to optimize the fit with the cryogenic section.