

PSA nitrogen generator process overview



PSA nitrogen generator terminology explanation

PSA: Pressure Swing Adsorption, which means: variable pressure adsorption.

PSA is a new gas separation technology, which has been rapidly developed in foreign countries since the late 60s and early 70s, and its principle is to separate the gas mixture by using the difference of "adsorption" performance of molecular sieve on different gas molecules. It uses air as the raw material to separate nitrogen and oxygen from the air by selective adsorption of a high performance, highly selective solid adsorbent.

Process Overview

Currently, carbon molecular sieves and zeolite molecular sieves are used in the field of nitrogen and oxygen production. The separation of oxygen and nitrogen by molecular sieves is mainly based on the different diffusion rates of these two gases on the surface of molecular

sieves. The carbon molecular sieve has a very small micropore composition with a pore size distribution between 0.3nm ~ 1nm. The smaller diameter gas (oxygen) diffuses faster and enters the solid phase of the molecular sieve more often so that the enriched component of nitrogen is available in the gas phase. After a period of time, the adsorption of oxygen by the molecular sieve reaches equilibrium, and according to the characteristics of the carbon molecular sieve at different pressures on the adsorption of different amounts of adsorbed gases, the pressure is reduced so that the carbon molecular sieve is released from the adsorption of oxygen, a process called regeneration. The VPS method usually uses two towers in parallel, alternating between pressurized adsorption and depressurized regeneration, thus obtaining an uninterrupted flow of nitrogen gas.

Scope of action

The method of separating nitrogen and oxygen by selective adsorption of oxygen and nitrogen using carbon molecular sieves as adsorbent, using air as raw material, is commonly known as PSA nitrogen production. This method is a new nitrogen production technology that was rapidly developed in the 1970s. Compared with the traditional nitrogen production method, it has the characteristics of simple process, high automation, fast gas production (15-30 minutes), low energy consumption, product purity can be adjusted in a wide range according to the needs of users, easy operation and maintenance, low operating costs, strong adaptability of equipment, etc., so it is quite competitive in the nitrogen production equipment below 1000m³/h, and is increasingly welcomed by small and medium-sized nitrogen users. PSA nitrogen production has become the preferred method for small and medium-sized nitrogen users.

