

## Single and Two-Column Oxygen Concentrators



**Problem Statement:** The severity of COVID-19 and its impact on people's livelihood created a huge opportunity for indigenously made oxygen concentrators (OCs). The researchers have developed affordable single and two-column OCs to help reduce the load on hospitals for mild symptomatic patients who do not require the high flow rate oxygen therapy or ventilators. This technology can also address oxygen requirements for patients with respiratory diseases who are highly affected by the deteriorating air quality in metropolitan cities.

**Uniqueness of the solution:** Oxygen enriched air based on the PSA (Pressure swing adsorption) technology is produced using zeolite material (Nitroxyl/LiLSX) and can be used for patients at homes and hospitals. For a single column machine, the amount of zeolite reduces by almost 50% compared to two-column systems. This invention relates to a unique thermodynamic cycle that reduces the necessity of actuators (solenoid valves)

by more than one for a two-column and two in a single column system. This technology reduces the burden of electronic waste and the amount of zeolite needed for the same oxygen flow rate. It also makes the machine more reliable due to fewer actuators and produces OCs in large quantities at an affordable cost.

**Current Status of Technology:**

The researchers have observed and formulated the technological concept of this machine well. Two machines called two-column and single column systems have been developed in the lab environment and validated for the required performance. The technology has been licensed to industry under IIT Bombay's licensing policy. IIT Bombay and the company involved have signed an MoU between them.

**Societal Impact:** The PSA technology to generate oxygen is very important for Indian society due to the severity of

the COVID-19 pandemic and worsening air quality in metropolitan cities. This technology can drive indigenously developed OCs and be an alternative to the expensive imported OCs that dominate the Indian market. It can generate employment, provide affordable oxygen therapy to patients at homes and hospitals and reduce the mortality rate due to its unavailability in suburban and remote areas.

**Patent(s):** Under progress

**Relevant Industries:** Healthcare, Thermodynamics, Cylinder.

**Faculty:** Prof. Sudarshan Kumar, Aerospace Engineering.