

CSIR-CMERI Oxygen Enrichment Unit – A potential multifaceted Life Saver

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An Oxygen enrichment unit is a device, which concentrates the Oxygen from the air around us by selectively removing nitrogen to supply an oxygen-enriched air. The concentrated Oxygen is delivered to the patients, having respiratory diseases, through oxygen mask or nasal cannula. The device may be used in remote places, homes or hospital like facilities for patients with chronic obstructive pulmonary diseases (COPD), chronic hypoxemia and pulmonary edema. It may be used as an adjunct treatment for severe sleep apnea (in conjunction with a continuous positive airway pressure unit).

The **CSIR-CMERI** indigenously developed Oxygen enrichment unit works on the principle of Pressure Swing Adsorption (PSA) and utilizes Zeolite Columns to selectively remove nitrogen from air under certain pressure, thereby increasing the Oxygen Concentration. The subsystems of oxygen enrichment unit are Compressor, solenoid operated 3/2 valves, flow meter and Pre-Filter. The Compressor feeds pressurized air into the module and oxygen is enriched on the permeate side due to its preferential permeation over nitrogen. The suspended particles, viruses, bacteria present in the air are filtered out by the available HEPA filter. The unit has been tested in TUV Rheinland, Bangalore as per IEC 60601-1 3.1 edition: 2012 standard for Electrical Safety compliance whereas the oxygen enrichment percentage vis-a-vis outflow has been tested with CSIR-CMERI in-house facility. The Oxygen Enrichment Unit developed by CSIR-CMERI is capable of delivering up to 30 LPM Oxygen enriched air, which is absent in the other commercially available units. The machine can regulate flow with accuracy 0.5 lpm. This facility will help in High Flow Oxygen Therapy, which is proven to be a better method in treatment and management of COVID-19 patients.

The commercially available Oxygen Enrichment Units generally work till 8000 ft from sea level. With an optional plug-in module, this unit can work upto the altitude of 14000 ft with a penalty on flow rate thereby making it very handy for the usage of the high altitude terrain battlefield in contingencies.

Though some other research establishments in the country have also developed such system, CSIR-CMERI's system having an outflow at 93% oxygen concentration level and 5 LPM is far ahead than those which merely gives the outflow of around 27-35%. The performance benchmarking of the unit has been carried out which find it at par with the reputed MNC's.

Prof. (Dr.) Harish Hirani, Director, CSIR-CMERI talking about the system shared that CSIR-CMERI developed oxygen enrichment unit may be very useful for homes, hospitals, Defense forces particularly in high altitude terrain and remote rural localities. It can be more effective and crucial for treating the patients of COVID-19. He also added that this unit may help reduce the demand for [oxygen](#) cylinders and ventilators and due to the rise in air pollution its demand is supposed to grow very rapidly as it is also useful for maintaining proper Oxygen level for an optimum healthy environment.

The material cost of this unit is approximately Rs. 35,000/-. The technology has been transferred to M/s. Zen Medical Technologies Pvt. Ltd., Ranga Reddy, Telangana.

RJ/SS/RP (CSIR-CMERI release)

