

Frequently asked questions : Oxygen Concentrator

Q1. What is the maximum concentration of oxygen that can be achieved with the concentrator?

Up to 94%

Q2. What kind of maintenance is required for the oxygen concentrator?

The device is as simple to manage as it looks. All that is required is that the coarse filter has to be washed each day and replace the other filters as per instructions of the company, which is usually at 6 months or 1500 hours of use. The filters may also need to be changed according to local conditions (dust, humidity) and the amount of use of the concentrator. Skilled mechanical maintenance is needed only yearly. There is a fourth filter, the bacterial filter, located before the oxygen outlet of the concentrator. Typically this must be changed every year, or more frequently, depending on the amount of use of the concentrator. The concentrator may work 24 hours a day, every day, as long as daily maintenance procedures are carried out. Every concentrator has an hour meter. The working hours should be written down in the service report.

Q3. How many babies can be treated at a time with the oxygen concentrator?

Up to 4 babies using a splitter

Q4. Are there any limitations of the oxygen concentrator?

In general oxygen concentrators have few problems during use but it is important to be aware of a few limitations.

- When air is hot and humid, as may be the case in many tropical countries during summer season, the concentration of oxygen may be reduced to 70% because in these circumstances moisture is absorbed by the molecular sieve material in preference to nitrogen.
- Low voltage may pose a similar problem by overheating the machine due to inefficient running of the motor. A voltage regulator should be used in these circumstances.
- At high altitudes (4000 meters), the oxygen concentration may be reduced to 80% due to low oxygen concentration in the air itself, but this should not cause serious difficulties in most cases.
- Small concentrators are not intended or suitable for compressed gas anaesthesia (Boyle's) machines or ventilators.

Q5. What are the Precautions during usage of the oxygen concentrator?

The precautions to be observed are:

- The concentrator should be placed as far away from the window as possible to avoid dust and moisture.

- The concentrator should not be used to deliver oxygen through **head box** or **face mask but use cannula**.
- It should be kept far away from open flames.
- Oxygen cylinders are recommended as a backup oxygen supply system in case of power failure as the oxygen reservoir in the machine lasts for only 2-3 minutes.
- When a flow-splitter is being used, the total flow should not exceed more than 4 liters per minute or the concentration of oxygen will decrease. This happens because the canisters have a defined volume and can only separate a known volume of nitrogen at a given time. Therefore, concentrators must not be used at flows higher than those stated by the manufacturer.

Q6. Has the concentrator been tested as to what is the exact concentration of oxygen being delivered to the patient and how long this concentration is constant? Does the concentration of oxygen decrease over time?

The oxygen concentration measured both by an oxygen analyser and by Scholander gas analysis was 92% when the flow was 2 L./min and fell to 81% at 3 L./min. After the build-up from 21% to 80-90%, which occurred over 20 minutes, the concentration of oxygen remained virtually constant for periods up to 16 hours, which was the longest time tested. From day to day the oxygen concentration at 2 LPM did not vary by more than 2%. The composition of the gas mixture delivered by the oxygen concentrator was first measured by the usual chemical methods (Scholander micro-analyser) and no carbon dioxide was detected. Further analysis by gas chromatography and mass spectrometry showed that apart from oxygen the mixture contained nitrogen and argon; traces of carbon dioxide and water vapour but no undesirable component such as carbon monoxide or oxides of sulphur or nitrogen were detected.

Q7. What are the other methods of providing oxygen therapy?

The other methods of providing long term domiciliary oxygen are cylinders delivered to the patient's home (the most widely used method) and liquid oxygen in a domestic tank replenished twice weekly in some countries. The capacity of the oxygen cylinder can range from 40- 3445 liters capacity and cost between Rs. 2,625-12,215. The cylinder can provide oxygen at 1 LPM for 11.3 hrs (e.g.680 litres capacity cylinder) or 4 LPM for 2.8 hrs. Thus the overall running costs turn out to be much higher than the oxygen concentrator. The use of a liquid oxygen system has been investigated in the United States. The apparatus consists of a portable "walker" and a reservoir which contains a supply for three to four days. Regular deliveries are required as for cylinders and this contributes appreciably to the cost.

Q8. What is the running cost of the equipment?

The initial cost of the concentrator is Rs 45,000-50,000, which may be considered expensive in comparison to cylinders. Nevertheless, the yearly running cost of Rs. 12,000-15,000 is substantially less than the Rs 2.5 to 3 lakh for providing cylinders

and the Rs 1.2-1.3 lakhs for liquid oxygen. Thus on cost alone the oxygen concentrator is the preferred means of providing oxygen treatment in developing countries with limited resources.

Q9. Does the oxygen concentrator require an oxygen sensing device?

Oxygen concentrator technology has improved rapidly and many concentrator companies are including oxygen sensing devices within the concentrator. The World Health Organization/UNICEF recommend that concentrators with sensing devices be purchased in countries where there is no other means of checking oxygen concentration. It is also prudent to have an oxygen analyzer for periodic checks (once every 3-6 months) of the oxygen concentration to be sure the sensing device is working properly.

Q10. What is the life of the Zeolite sieve filters?

The life of the zeolite crystals can be expected to be at least 20,000 hours which in most situations would give about 10 years use.