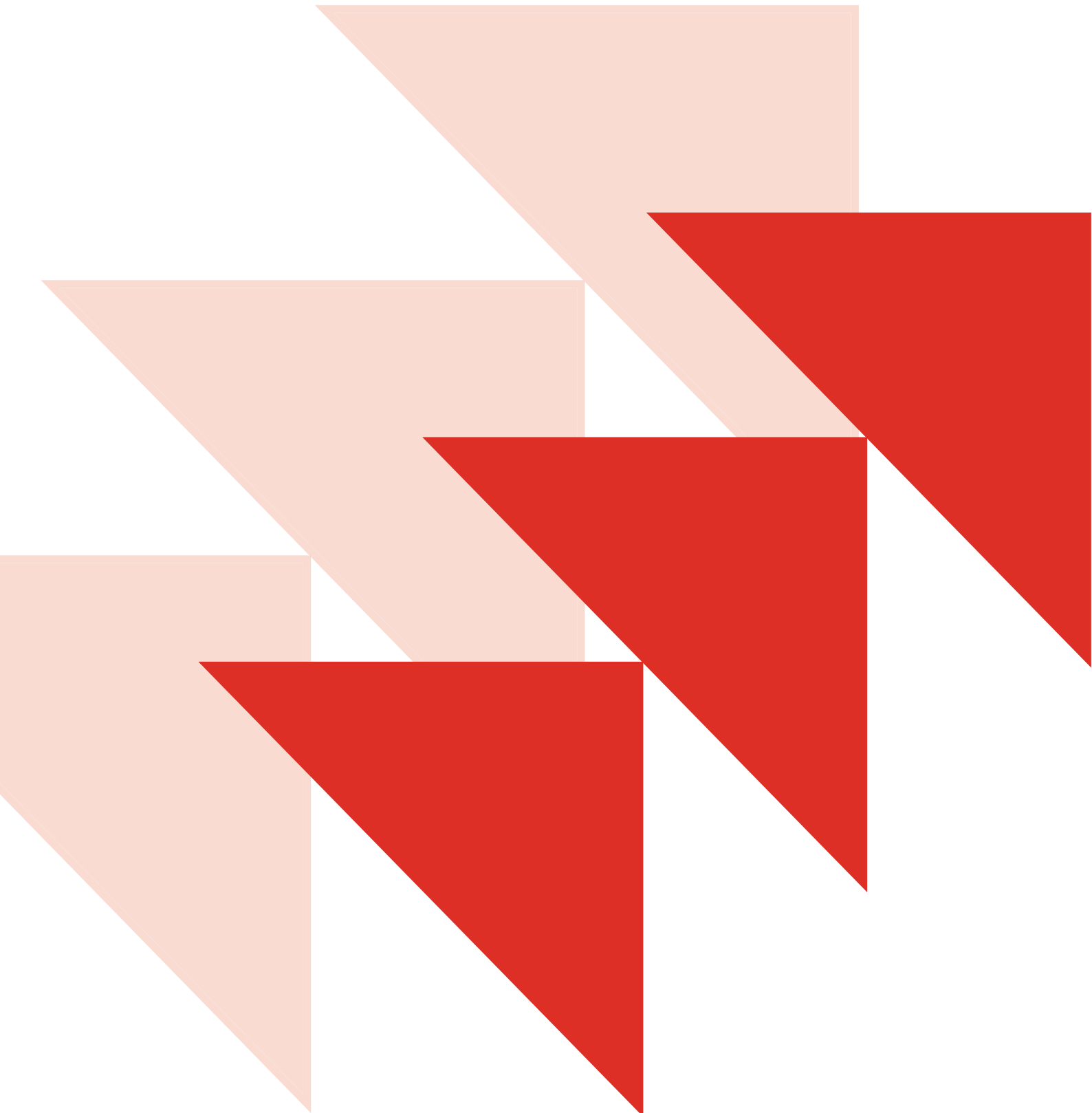
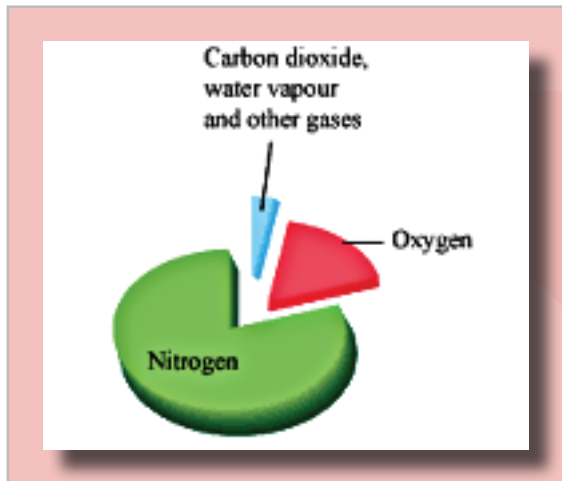


GENERATING OXYGEN FOR HOSPITALS



PSA uses only air: Air contains oxygen

The major input in the production of oxygen using PSA processes is air. The proportion of oxygen in dry air is 20.95% oxygen.



The other major gas present in air is nitrogen (78.09%), with argon (0.93%), carbon dioxide (0.04%) and other gases constituting the remainder. Air also contains a variable amount of water vapour: the average proportion in the entire atmosphere is 0.4% and that at sea level is 1%.

The principle of PSA: Selective adsorption at high pressures

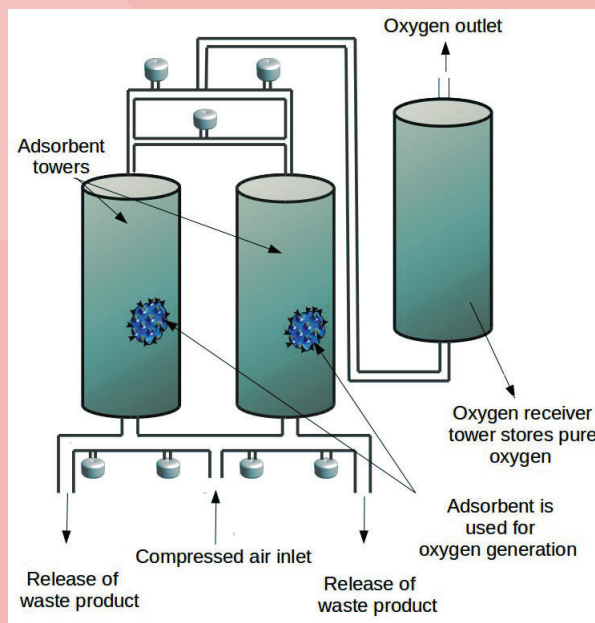
In a PSA process, air is pressurised and passed through a solid substance. The process relies on the fact that under such conditions gases tend to be adsorbed by solids. And some materials adsorb certain gases more than they do other. For example, the adsorbent used in PSA-based oxygen production attracts nitrogen more strongly than it does oxygen.

There is a limit to the amount of gas the adsorbent material can hold. It is said to be saturated when it holds this amount of gas.

If the pressure is increased, more gas is adsorbed. Conversely, reducing the pressure causes the adsorbed gas to be released ('desorbed').

The PSA process

The steps in the PSA process of oxygen generation involve passing compressed air through a tower containing adsorbent material that absorbs nitrogen in preference to oxygen. The nitrogen in the compressed air is removed by the adsorbent material, leaving behind oxygen, which is collected and stored. When the adsorbent material is saturated, the nitrogen in it is desorbed. In practice, two towers with adsorbent material are used alternately so that the production of oxygen is continuous.



Schematic representation of a PSA system for generating oxygen

Step 1

Air drawn from the atmosphere is compressed using an air compressor. The compressed air is dried and filtered.

Step 2

The compressed, filtered air is sent through one of the towers. As it flows through the tower, the adsorbent material adsorbs the nitrogen, and the oxygen passes through to the oxygen accumulation tank.

Step 3

Just before the adsorbent material becomes saturated with nitrogen, the adsorption process is interrupted by diverting the input air to the second tower. At this point the second tower starts to adsorb nitrogen and produce oxygen.

