

molecular

T E C H N I C A L   A R T I C L E

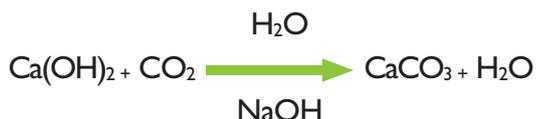


An Introduction to Sofnolime®

# Technical article

## An Introduction to Sofnolime®

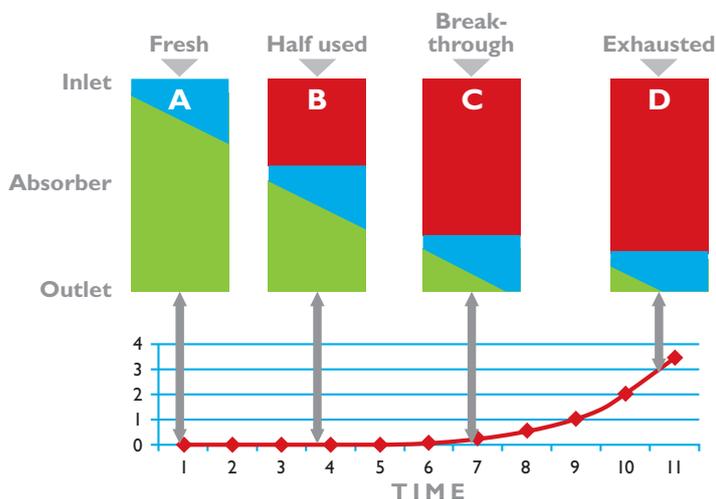
Sofnolime® is Molecular Products' brand name for soda lime. Soda lime is an absorbent used for removal of carbon dioxide mainly from breathable gases, in medical, military and safety applications. The Sofnolime® is contained in an absorber, appropriately sized for the application. The gas is passed through the absorber and the CO<sub>2</sub> is removed by a water mediated base catalysed chemical reaction, converting the CO<sub>2</sub> to calcium carbonate and H<sub>2</sub>O which is retained within the absorber. The strong base, in this case NaOH, is not used up but acts as a catalyst.



The absorber will have a finite life based on the quantity of Sofnolime® contained and the level of CO<sub>2</sub> within the treated gas. The absorber will remove all of the CO<sub>2</sub> (if appropriately sized for the application) and once the Sofnolime® is consumed, CO<sub>2</sub> breakthrough will occur and the CO<sub>2</sub> level in the exiting gas stream begins to increase. Sofnolime® can also remove a range of other 'acidic' gases.

Particle size and shape are particularly important in terms of the performance of Sofnolime® in its intended application. All Sofnolime® grades are irregularly sized extruded granules, with low dust and excellent attrition resistance.

### How an absorber works



Reaction Zone = Residence time needed for reaction

Legend: Reaction (blue), Unused (green), Exhausted (red), % at exit (red diamond)

- A** - Reaction zone established with CO<sub>2</sub> gradient within it.
- B** - Reaction zone moves through length of absorber bed.
- C** - Breakthrough occurs when the first part of the reaction zone CO<sub>2</sub> concentration gradient reaches the outlet.
- D** - Outlet CO<sub>2</sub> concentration increases exponentially as capacity section of absorber is used up.

### Particle shape

The majority of Sofnolime® grades are now produced with a D or triangular shaped profile giving a higher surface to volume ratio compared with other classical soda lime products. In addition, the profile shape ensures maximum CO<sub>2</sub> penetration into the particles, by minimizing the distance to the centre of the particle, thereby increasing the CO<sub>2</sub> capacity of the product. Intrinsic capacity measurements have demonstrated that Sofnolime® has significantly higher capacity for carbon dioxide absorption compared with other manufacturers' products.

The particle size of some product grades change with the applications, the profile of the particles is matched to the specific performance for that application.



### Particle size

Another key factor in the performance characteristics of Sofnolime® is the particle size distribution. Particle size has an effect on the speed of reaction, which in turn affects the volume of the reaction zone and the capacity of the absorber containing the Sofnolime®. In general terms, the smaller the particle size, the faster the reaction and the smaller the reaction zone volume. However, the smaller the particle size, the greater the pressure drop across the absorber which in some applications (particularly breathing applications such as diving re-breathers and medical anaesthesia) is a critical factor in absorber design. Therefore a well designed particle shape/size will look to optimise these effects - an area where Molecular Products Ltd has proved extremely proficient.

In summary, compared with other classical soda lime products, Sofnolime® has a high absorption capacity for carbon dioxide, low dust levels, and excellent attrition resistance.

## Disposal of Sofnolime®

Landfill class: Hazardous waste

### Hazards

The material is classified as hazardous waste due to the small amount of sodium hydroxide present (minor component) and the irritant nature of the calcium hydroxide (hydrated lime – major component). A proportion of the sodium hydroxide will be water leachable.

**Note:** Other contaminants may be present in used Sofnolime® depending on the use and the materials it is exposed to during use.

### Description

Creamy granular material with no significant odour, containing dust of the same composition.

**Note:** The risk classification of Sofnolime® is Irritant Xi, Risk phrases: R36/R38, Safety phrases S2, S26, S37/39 and S45.

The information regarding the disposal of Sofnolime® relates to the UK only. Other territories may have different regulations and/or classifications.

Component		Hazard
Calcium hydroxide		(irritant)
Calcium carbonate	0 – 80 %	(non hazardous)
Calcium oxide	zero (< 0.1%)	
Sodium hydroxide	0 – 4%	(corrosive)
Other inorganic components	< 1%	(all non hazardous)
Organic components	< 1%	(all non hazardous)
Water	Balance	



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