Carbon dioxide absorption system

Used in closed system and semiclosed system (partial rebreathing). It is a transparent (easily inspected) canister containing strong alkali.

Alkali are: Soda lime: mixture of sodium and calcium hydroxide
Baralyme: mixture of barium and calcium hydroxide

Soda lime: White colored, NaOH 5%, KOH 1%, $Ca(OH)_2$ 94%, Silicate to prevent dust formation and moisture(14-19 % water).

During absorption: $CO_2 + H_2O \longleftrightarrow H_2CO_3$

$H_2CO_3 + NaOH + KOH \longrightarrow Na_2CO_3 + K_2CO_3 + Water$ (regeneration)

$Na_2CO_3 + Ca(OH)_2 \longrightarrow CaCO_3 + NaOH + KOH$ (some regeneration)

Calcium carbonate is the result of CO_2 absorption and reaction with calcium hydroxide

Barium hydroxide lime(Baralyme): Pink colored, $Ba(OH)_2$ 20%, $Ca(OH)_2$ 80% + water + trace KOH

During absorption: $CO_2 + H_2O \longleftrightarrow H_2CO_3$

$Ba(OH)_2 + H_2CO_3 \longrightarrow BaCO_3$ (Barium carbonate) + Water

$Ca(OH)_2 + H_2CO_3 \longrightarrow CaCO_3$ (Calcium carbonate) + Water

Indicators: Chemical dyes incorporated into the lime granules

Soda lime: Ethyl violet indicator, originally white and turn to purple when exhausted

Baralyme: Peeramine brilliant yellow + Ethyl violet indicator, originally pink and turn to purple when exhausted

A fresh granules are soft and can be crushed by fingers. On exhaustion, they became very hard.

Trichloroethylene should not be used with absorption system as it forms Phosgene gas which is respiratory irritant and trichloracetylene which is explosive and neurotoxic to V & VII cranial nerves.