

Carbon Dioxide Absorption Capacities of Amsorb[®] and Soda Lime During Simulated Clinical Conditions

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Amsorb[®] is a carbon dioxide absorbent designed for low flow anesthesia that does not produce harmful byproducts such as formaldehyde, compound A, or carbon monoxide because it does not contain sodium hydroxide. Prior research has shown that Amsorb[®] absorbent is exhausted faster than soda lime, which contains sodium hydroxide.¹ The aim of this study was to examine longevity and color changes of pre-packed soda lime (Sodasorb[®] or Medisorb[®]) and Amsorb[®] canisters in Aestiva and Avance anesthesia machines during simulated clinical conditions.

Three of each canister type (Sodasorb[®]/Aestiva, Amsorb[®]/Aestiva, Medisorb[®]/Avance, Amsorb[®]/Avance) was studied after the starting weight of contained absorbent was measured. Aestiva anesthesia machines hold two absorbent canisters; to speed the study, only the upper canister contained absorbent and the lower canister was filled with fish tank gravel. During each trial, CO₂ was metered at a rate of 250 ml/min into a 2 L breathing bag attached to the Y-piece of a circle breathing system. The breathing bag was ventilated using pressure control at a rate of 10/min and an inspiratory to expiratory ratio of 1:2 to achieve tidal volumes of roughly 500 ml. Low fresh gas flow of 1 L/min oxygen was maintained. Lines on each canister marked 20%, 40%, 60%, and 80% of the distance from top to bottom. Photographs of the canisters were taken at 30-minute intervals. Inspired and expired CO₂ concentrations were continuously recorded from the breathing circuit elbow sampling site. Endpoints included times until inspired partial pressure CO₂ reached 4, 6, and 8 mmHg. Absorbent capacity was calculated as total amount of CO₂ added to the breathing circuit per 100 grams of absorbent at the time when the inspired partial pressure of CO₂ equaled 4 mmHg.

Results are shown in the table. There was no difference (P=0.085) in absorbent capacity between soda lime and Amsorb[®]. Serial photographs of the canisters during each trial revealed variable visible color changes due to channeling, but that when 60% of the canister had changed color the inspired CO₂ was usually 4 mmHg.

These absorbent CO₂ capacity comparisons can be used to estimate the cost of absorbent use or change from one absorbent to another.

Table. Amount (in L) of CO₂ absorbed per 100 g of absorbent at time when partial pressure of CO₂ in the circuit equaled 4 mmHg

CO ₂ absorbent	Aestiva Trial 1	Aestiva Trial 2	Aestiva Trial 3	Avance Trial 1	Avance Trial 2	Avance Trial 3	Average
Amsorb [®]	18.4	16.7	16.5	17.3	17.0	14.9	16.8
Medisorb [®] /Sodasorb [®]	18.7	19.3	16.0	19.1	16.9	19.2	18.2

T test: P value = 0.085

1. Hendrickx JFA, De Ridder SPAJ, Dehouwer A, et al. *J Clin Monit Comput* 30;193,2016.
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