

B. CO₂ Absorption Profiles

In Fig. 8 we see the deposition of calcium carbonate as CO₂ is absorbed and reacts with sodalime absorbent. The percent of saturation of each cell with reacted CO₂ is color coded: 100% saturation is yellow, 30% saturation is purple, and less than 30% saturation is transparent.

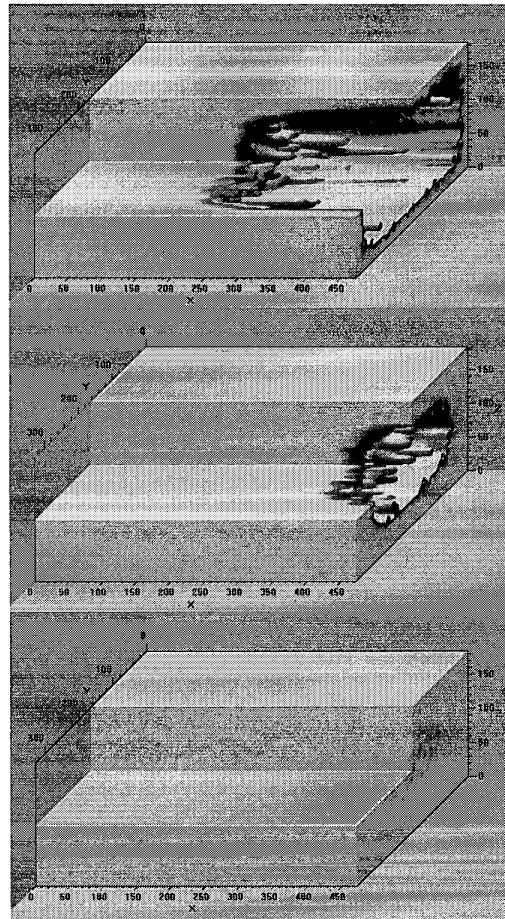


Fig. 8. 70° F canister in 50° F water. Yellow = 100% CO₂ saturation, purple = 30% saturation, transparent = <30%.

IV. APPLICATION

A. Transients

When a scrubber canister is used in a backup or redundant diving system in cold water, the cold canister may be slow to start scrubbing. Curiously, once scrubbing has started, it may not last for the normal duration. One of our first uses for our kinetics model was to find out why absorption reactions in cold canisters in cold water were not self-sustaining.

This transient behavior was demonstrated in our laboratory where we used a bench top absorbent testing system. Absorbent was contained in a 100 mL capacity glass tube surrounded by a water bath that allowed the surface of the glass "canister" to be kept at 34° F. Fig. 9 shows how the CO₂ in the effluent varied with time. CO₂ began rising almost immediately, then started a recovery. The recovery of scrubbing ability was short-lived, however, and after a few minutes the CO₂ resumed its rapid climb.