

Pilot Scale Studies of Carbon Dioxide Capture and Storage at Ambient Conditions

Researcher: Brett Spigarelli

Abstract

Carbon dioxide (CO₂) capture experiments were conducted at ambient conditions in varying weight % alkali solutions. Initial experiments were conducted in 1000 ml Erlenmeyer flasks to determine the optimal amount of alkali in solution to be used on a pilot scale. It was concluded that a 2% alkali solution, by weight, was the most efficient solution for capturing CO₂. The solution was able to absorb 0.5 kg CO₂/kg alkali (0.5 lb CO₂/lb alkali). Pilot scale studies were conducted to determine the feasibility of using an alkali solution on an industrial scale to capture CO₂. Pilot scale studies were carried out in a wet scrubber to mimic industrial desulfurization processes used at fossil fueled power plants. The ability to retrofit a carbon dioxide capture scheme to existing plant equipment will reduce the economic burden placed on a company to employ the technology. The scrubber was constructed using 0.101 meter (4 inch) inside diameter black steel and PVC piping. The scrubber was packed with 8 x 8 mm (0.315 x 0.315 inch) borosilicate glass raschig rings to a depth of 1.22 meters (4 feet). Pilot scale studies have shown that the optimal alkali solution can continuously capture up to 50% of the total CO₂ being fed to the scrubber.