

# Removing Carbon Dioxide from Coal Exhaust via an Olivine and Sodium Hydroxide Filter

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Carbon dioxide (CO<sub>2</sub>) emissions from burning coal for industrial and energy purposes account for a sizable portion of the United States total CO<sub>2</sub> emissions. Commercially viable CO<sub>2</sub> sequestration with magnesium silicates, such as olivine, is still primarily experimental. My previous research showed that the forsterite variety of olivine and 2M sodium hydroxide (NaOH) is able to sequester 5000-ppm CO<sub>2</sub> quite well in a flow through system. However, coal exhaust differs from 5000-ppm CO<sub>2</sub> air mixture in that it has: considerably higher concentrations of CO<sub>2</sub>, a wide range of other chemical pollutants (some of which react with NaOH), and high levels of particulate matter. In order to test the effect of such differences on an olivine- NaOH filter's ability to sequester CO<sub>2</sub>, a flow through system was designed. Exhaust from burning coal was bubbled through a 2M NaOH and olivine filter as well as a filter containing only water. CO<sub>2</sub> readings were taken both before and after the exhaust passed through the filters in order to determine each filter's efficacy at removing CO<sub>2</sub> from coal exhaust. When using an olivine-NaOH filter there was a 47.28% average decrease in CO<sub>2</sub> levels after exhaust passed through the filter. This decrease is significantly greater than the 1.16% average decrease in CO<sub>2</sub> levels with the water only filter. In conclusion, results from this experiment indicate that an olivine-sodium hydroxide filter is indeed capable of sequestering CO<sub>2</sub> from coal exhaust, and as such, may have applications for CO<sub>2</sub> sequestration systems in industrial settings such as coal fired power plants.

**Awards Won:**

