

A. Title of Research Project

Design and Fabrication of a Device for Carbon Capture in Mobile Emission Sources

B. Authors

Ihab Naser, Said Ali, Samer Ahmed

MIE Department, College of Engineering, Qatar University, P O Box 2713,
Doha, Qatar

C. Abstract

Carbon capture and sequestration (or carbon capture and storage, CCS) is considered to be a critical strategy worldwide and in Qatar as well to limit carbon dioxide (CO₂) emissions; the main greenhouse gases responsible for global warming. This work focuses on designing a simple device for CO₂ capture that can be used in mobile systems like vehicles and ships. The device is mainly consists of a compact cylinder filled with an absorbent solution for the CO₂ emissions. A distributor with a special design is used to increase the area of contact between CO₂ gas and the solution in order to increase the absorbent efficiency. Figure 1 shows a schematic diagram of the test rig. Different materials that have high absorption characteristics of CO₂ such as NaOH and MgOH have been used to evaluate the device performance. At the first stage of this work, the CO₂ emission has been simulated by injecting a mixture of CO₂ and N₂ into the device to be used as a proof of concept. A number of parameters including absorbent material concentration and a mixture (CO₂/N₂) flow rate are tested in order to reach the maximum absorption efficiency. CO₂ percentage is measured at the entrance and exit of the device to calculate the absorbent ratio with the time. The second stage of this work will include testing the device with actual internal combustion engine in order to evaluate the device at actual conditions.