Desulfurization of natural gas for fuel cells

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Bloom's systems run off of pipeline natural gas; before this gas enters the fuel cells it must be "desulfurized". During this process sulfur and other harmful impurities must be completely removed from the gas stream. To do this, the gas is passed through a number of packed beds which have each been tailored to pick up these impurities. Each vessel is filled with sorbents that purify the gas through physisorption and/or chemisorption. We operate at near ambient temperature and less than 15psig of pressure.

Bloom is continuously working to improve the effectiveness of the desulfurization sorbent materials already in use and to qualify new sorbents for field use. Before putting any new materials in the field, we must first qualify them on a lab scale. These lab tests must be accelerated in order to obtain results quickly and also accelerated to keep the overall experiment costs low. Ideally these lab tests will enable us to compare the relative performance of two materials against each other. If for example, in a lab test, 'Material A' outperforms 'Material B', we expect 'Material A' must also outperform 'Material B' in the field. Since many factors impact how the materials will perform in the field (and since we cannot introduce each of these elements into our lab tests), we do not expect to have identical lab and field results; the relative performance of any two materials, however, should be same. We need to determine the best way to design a lab scale version of our large field vessels. Dimensions of the lab test beds (including diameter & length) will significantly impact the cost and results of the tests. Not all sorbents are the same size and shape; certain materials may have an advantage solely because of their size. Flow rate, contact time, and space velocity also need to be defined as each will impact the results of the lab tests.