552d Membrane Gas Separation through the Internet

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Membrane gas separation experiments have been included in the unit operations laboratory of many departments due to the availability of compact, turn-key, laboratory systems from Permea (Air Products and Chemicals, Inc.). The modification of one system to permit operation through the Internet is reported here.

The experimental system separates air into a nitrogen enriched product and an oxygen enriched product. The user may run the system in either co-current or counter-current mode and measure the flow rates and compositions of both product streams.

The experiment is controlled locally with LabVIEW®. A LabVIEW VI communicates with a MySQL database to obtain control instructions and save experimental data. The user communicates with the same database through a PHP driven web site. The local control computer may be the same computer that runs the web site and database or one may use separate computers, in different locations for these functions.

An update on the educational effectiveness of Internet-delivered laboratories is presented as well. The effectiveness of Internet-delivery versus hands-on delivery is evaluated through a combination of focus groups, surveys, and grades. These assessments indicate educational effectiveness does not suffer dramatically from Internet-delivery. However, as expected, the lack of hands-on, visual interaction with the equipment is the major drawback.