Automated System Involving Gases for Adsorption Experiments (#8242)

An automated micro-breakthrough system that allows for the active monitoring of adsorption processes, yielding a more accurate product.

Inventors at Georgia Tech have developed an automated micro-breakthrough system to carry out adsorption experiments using a multitude of gases, including acid gases. The instrument has the ability to automatically control temperature, flow rates, valves, and the detection system to monitor the adsorption process. All data is stored and analyzed in real-time by unique monitoring software. Based on preprogrammed conditions, the software makes decisions to change system parameters. After sample insertion and starting the user-defined program, the apparatus is able to run on its own and turn itself off. The hardware-software partnership allows the apparatus to be self-learning and reduces the workload of the operator.

Benefits/Advantages

- **Versatility** - current dynamic systems are not acid-gas compatible and focus on static measurements
- **Human error elimination** - developed hardware follows direction from the software as opposed to manual instruction
- **Autonomy** - experiments are completed without the presence of the operator
- **Repeatability** - integrated software/hardware allow for the conduction of multiple, reputable trials

Potential Commercial Applications

- Environmental processes
  - Production of O2 enriched air
  - Separation of CO2 and H2O from natural gas
- Academia
  - Multi-component gas separation
  - Sorption capacity determination

Background/Context for This Invention
Adsorption is the fastening of molecules or ions from a gas, liquid, or dissolved solid to a surface in a system. Experimental adsorption processes assist with the separation of gases into individual components. This process aids industry and academia with developing enriched “air” in the concentration of molecule per molecule as desired. Currently, the accuracy of adsorption processes is wavering at the discretion of the operator’s error. Available systems on the market do not offer efficient dynamic ability to automate and monitor the process, relying on the user’s continuous analysis to accurately achieve their intended goal.

Dr. Bartosz Jakub Marszalek
Researcher- Georgia Tech School of Chemical and Biomolecular Engineering

For more information about this technology, please visit:
https://industry.gatech.edu/technology/automated-system-involving-gases-adsorption-experiments