Hiden-IGA, from Hiden Isochema, is a humidity-compatible sorption instrument which is capable of studying pure and mixed gas-vapor adsorption experiments gravimetrically at various temperatures (263-773 K) and a wide range of pressure (0-20000 millibar) (see Picture below). Prior to this instrument, our capabilities were limited with respect to mixed gas-vapor adsorption. Therefore, we thank ISEN for contributing to the purchase of the instrument.

This is a key instrument for research on natural gas storage as well as CO$_2$ sequestration (CCS) as these gases naturally contain certain percentage of water and other impurities such as nitrogen, ethane, propane etc.

Since the installation:

a) we have been routinely using this instrument to determine isosteric heat of adsorption ($Q_{st}$; a measure of average enthalpy of adsorption) of CO$_2$ (Figure A) at a wide range of loading (0-20000 millibar).

b) Among the various experimental options accessible with this new instruments, we have been frequently performing water vapor (figure B), humid gas, binary gas mixture (among N$_2$, CO$_2$, CH$_4$, ethane, propane, propylene etc) adsorption isotherm for performance evaluation of newly synthesized porous materials pertaining to energy and sustainability research not only from our lab but also from other labs at NU.
c) wide temperature and pressure ranges allows for any given sample to be used for many experiments which in expedites the research timeline.

d) Furthermore this instrument allows us to detect the relative amount of adsorbents from a binary gas and or a gas-vapor adsorption via utilizing its integrated high-sensitive mass spectrometer.

Plot of (A) isosteric heat of adsorption of CO$_2$ and (B) water adsorption isotherm perfluoroakne functionalized NU-1000 MOF. Water adsorption isotherm for a known Cr3-cluster based mesoporous MIL-101 (light purple triangle) and ZIF-8 (light cyan square) MOFs are presented for comparison purpose.

Several manuscripts that includes data collect on this instrument are in preparation.