

Supplementary Information

The reactor and control system has been custom-built by Zeton B.V.; a schematic is shown in Figure S1. The cylindrical reactor is made from silicon nitride (Si_3N_4) and is of internal diameter 20 mm. The reactor sits within the (vertical) bore of the MR magnet. Pressure in the reactor is controlled using pressure control valves at the exit of the reactor. For these experiments, the reactor is configured to operate under conditions of continuous two-phase flow, in a co-current down-flow mode. The positions of thermocouples are shown in Figure S1; inside the reactor, thermocouples are placed above and below the catalyst bed. The reactor is heated by electrical trace heating around the outside of the reactor. The trace heating around the reactor leaves an electrically-free insulated section in the centre of the reactor (160 mm in length) to avoid interference with the NMR measurements. In this region there is high-performance insulation on the outside of the reactor and the heat is conducted along the wall of the reactor. Temperature, pressure and flow rates are monitored and controlled via a Labview interface. The field-of-view of the MR measurement includes the entire length of the catalyst bed.

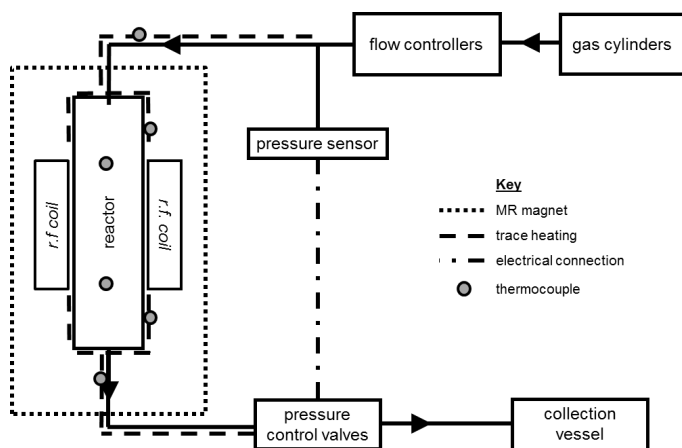


Figure S1. Schematic of the reactor and control system.