

ABSTRACT

Membrane residue curve maps (M-RCMs) are a useful graphical tool developed by Peters, M.; Kauchali, S.; Hildebrandt, D.; Glasser, D. (2006) to better understand and design membrane separations. The maps, initially developed theoretically, track the compositional change of the retentate with time during batch permeation.

This dissertation looks at the modification and operation of an experimental apparatus for the measurement and hence existence of M-RCMs. For demonstration purposes, gas separation was chosen for the basis of the membrane separation system. The gas mixture consisted of syngas with carbon dioxide as an impurity through a polyethylene membrane.

The theoretical transport of gases moving through the membrane was developed by a solution-diffusion model that fitted the experimental system adequately. The experimental setup was successfully operated as the results obtained correlate to the theoretical models chosen. In addition, the experimental apparatus can be used for the validation of M-RCMs for any type of membrane and mixture of gases.