HybSi®-AR membranes for acetic acid dehydration

Authors

H.M. van Veen[1], M.M.A. van Tuel[1], M.D.A. Rietkerk[1], A. Motelica[1], J.F. Vente[1]

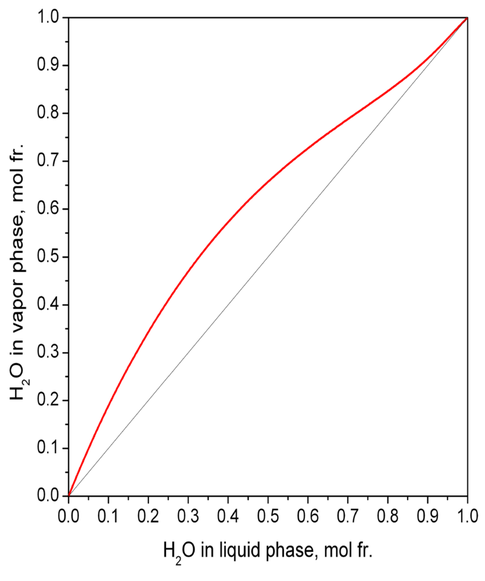
Corresponding author: vanveen@ecn.nl

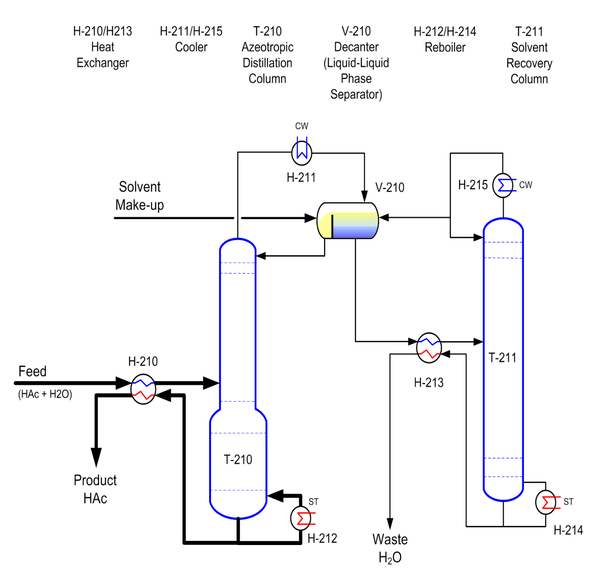
www.ecn.nl
P.O. Box 1
1755 ZG Petten
The Netherlands

Introduction

Pervaporation based process for energy efficient dehydration of acetic acid:

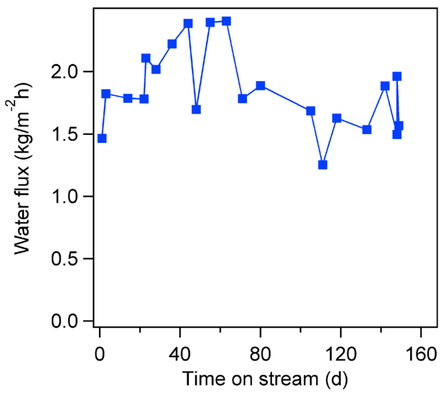
- HAc: important commodity chemical
- HAc - H_2O: close boiling points and narrow VLE curve
- Distillation + liquid-liquid extraction can reduce energy consumption by 20-40%, though large recycle is needed
- Improve efficiency further by pervaporation to separate main part of the water
- New HybSi®-Acid Resistant membrane developed with high acid stability and enabling high temperature use

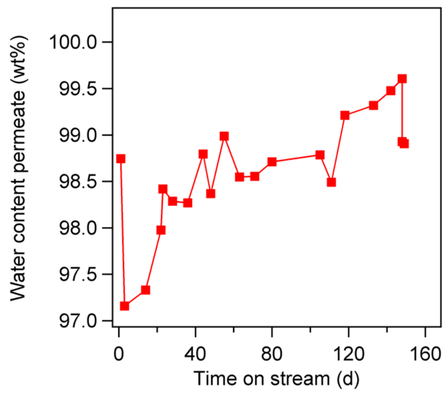




Increased acid resistance

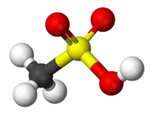
- Feed: 10% H_2O in HAC at ~ 100°C
- No change in performance during 150 days of continuous testing

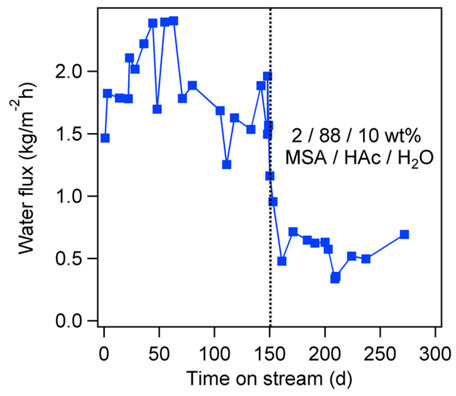


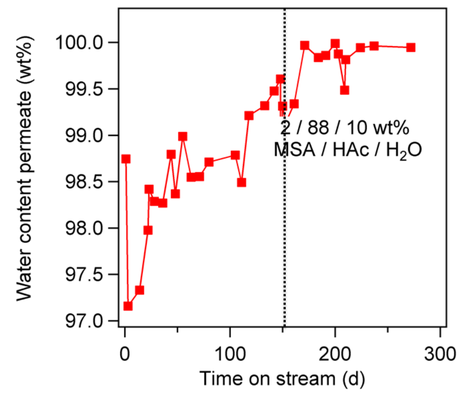


Further acid resistance

- Add 2 wt.% Methane Sulphonic Acid = decrease pH to ~ 0.5
- Reduced flux due to reduced driving force
- No membrane damage during > 125 days continuous operation

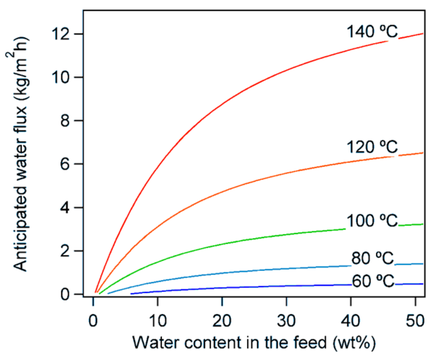




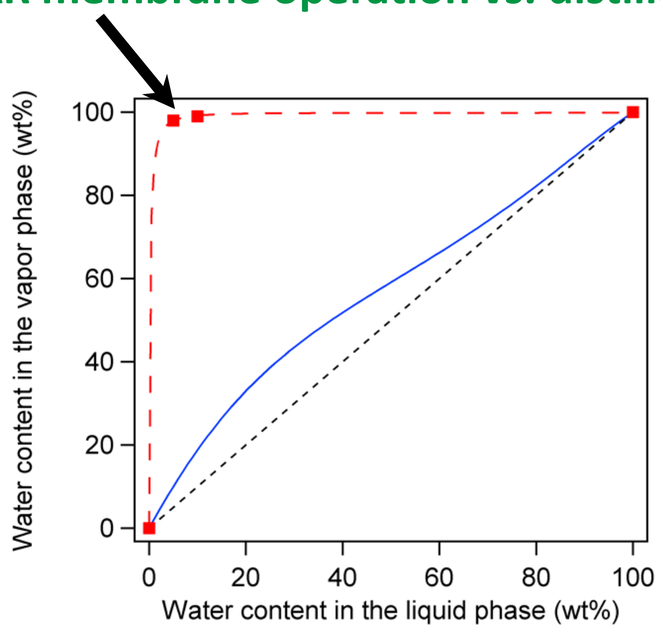


Outlook

- High selectivity one step purification
- High fluxes possible under industrial conditions
- Highly resistant against selected media and conditions
- Potential use in esterification and acetalisation reactions



HybSi®-AR membrane operation vs. distillation



Conclusion

- The new HybSi®-AR membrane is resistant against organic acids even at very low pH values

Acknowledgements

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[1] ECN Biomass & Energy Efficiency, P.O. Box 1, 1755 ZG Petten, The Netherlands