

Thermal Distillation

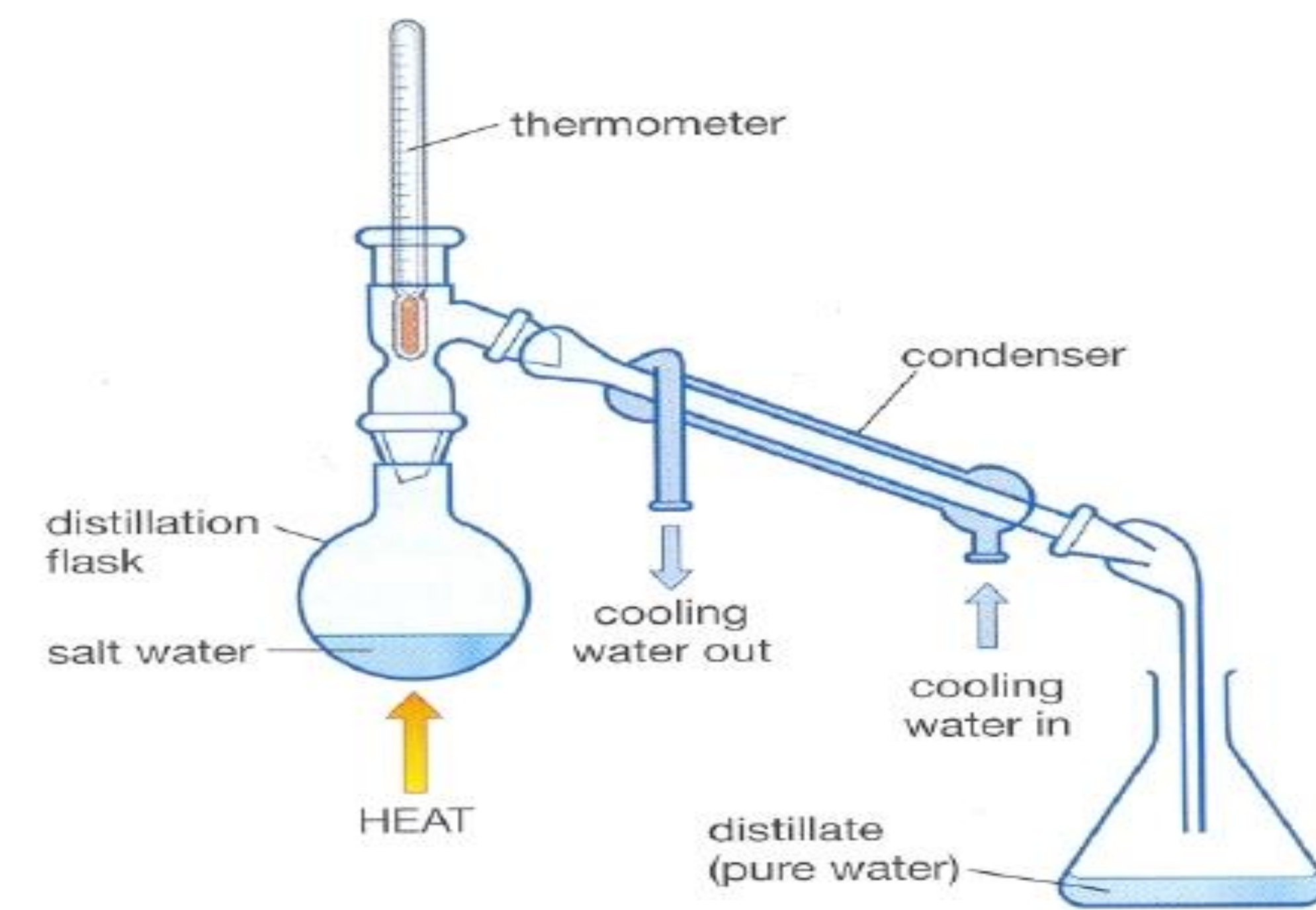


Fig 1: Thermal Distillation Unit

Membrane Distillation

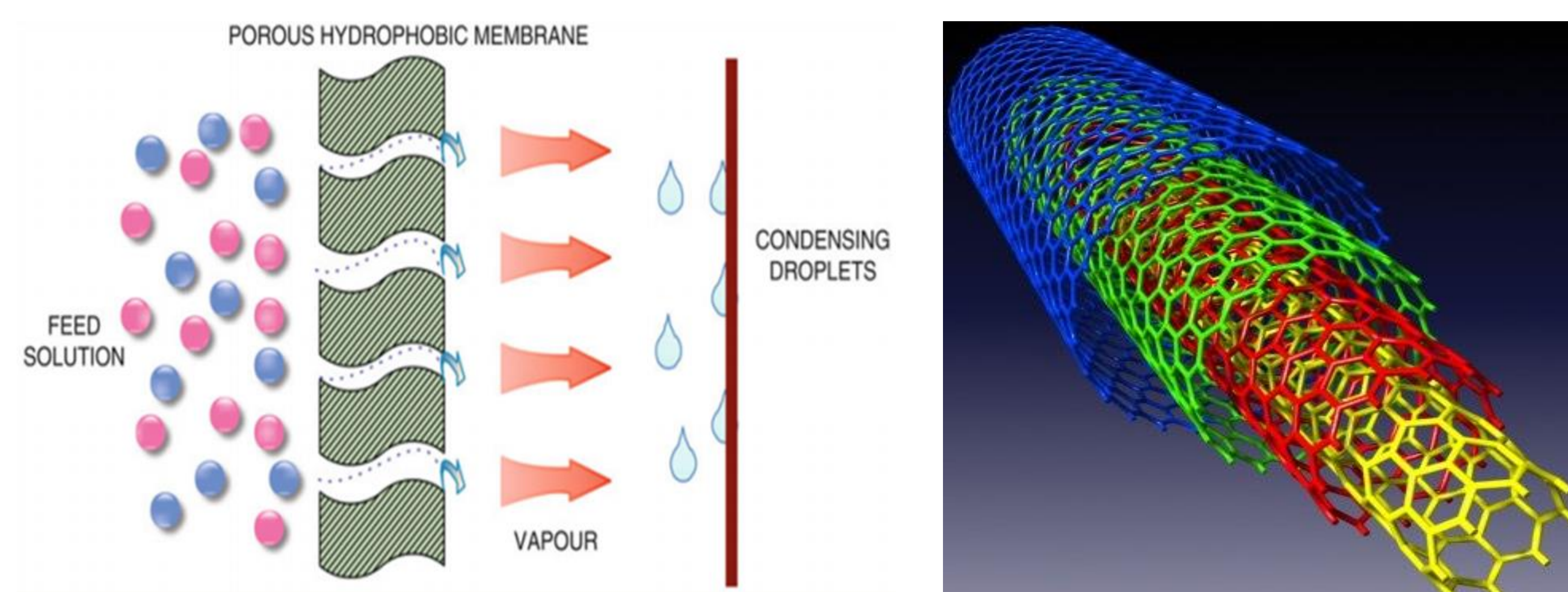


Fig 2: Membrane Distillation Schematic and CNTs

Experimental Setup

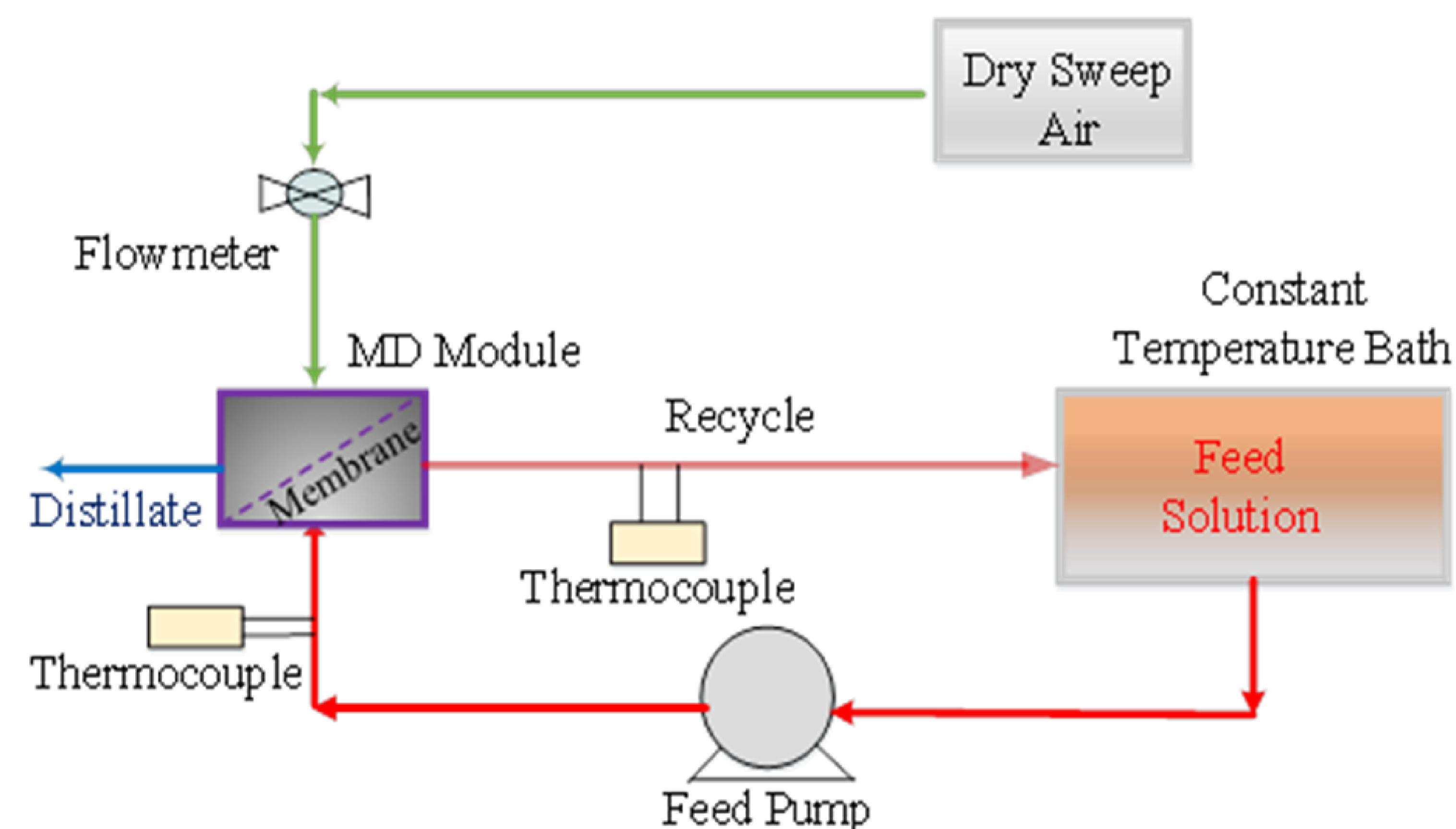


Fig 3: Experimental Setup

Reference: Gupta, O.; Roy, S.; Mitra, S., Enhanced membrane distillation of organic solvents from their aqueous mixtures using a carbon nanotube immobilized membrane. Journal of Membrane Science 2018, 568, 134-140.

Proposed Mechanism

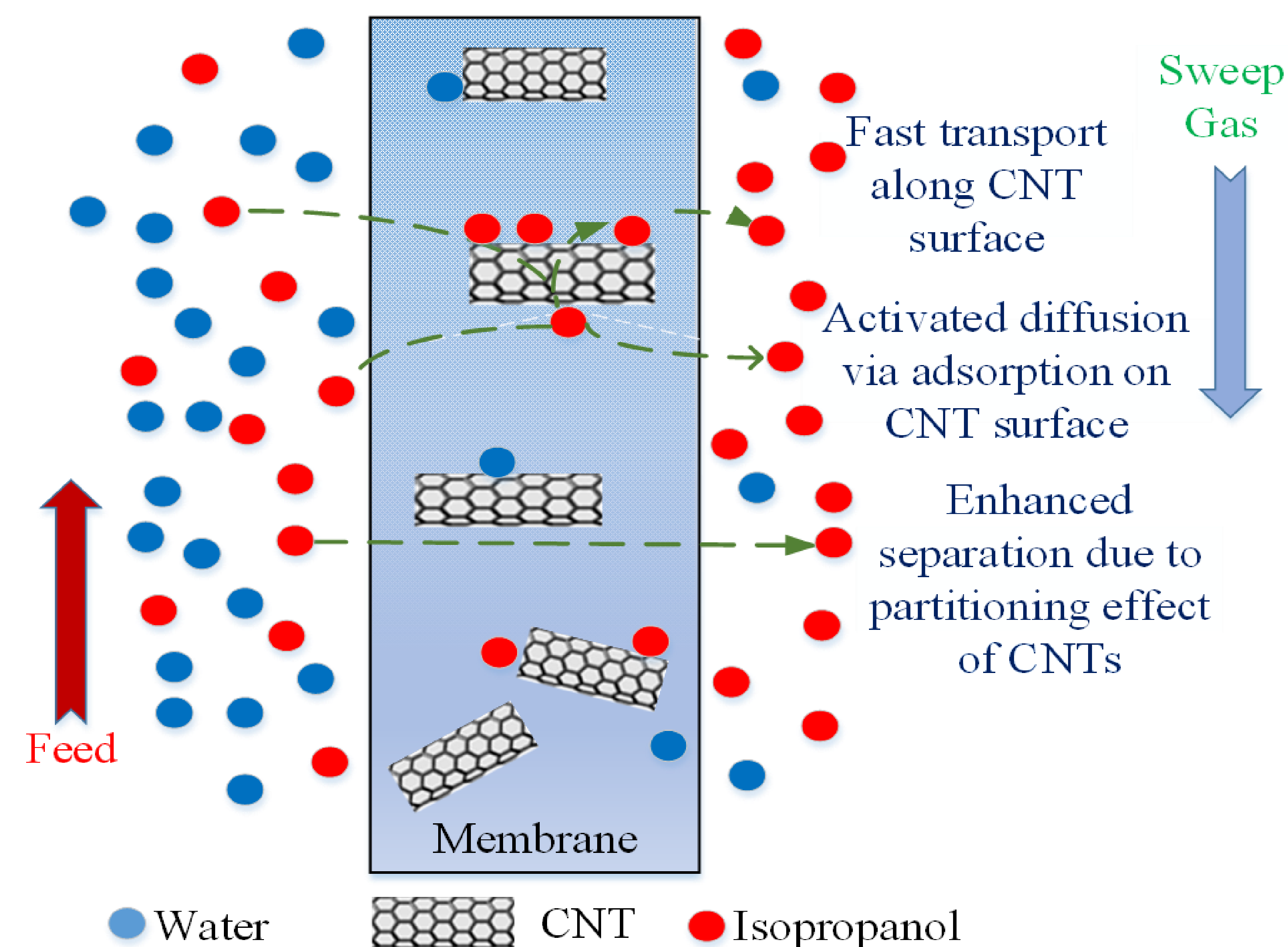


Fig 4: Proposed Mechanism of CNTs

Effect of Operating Parameters

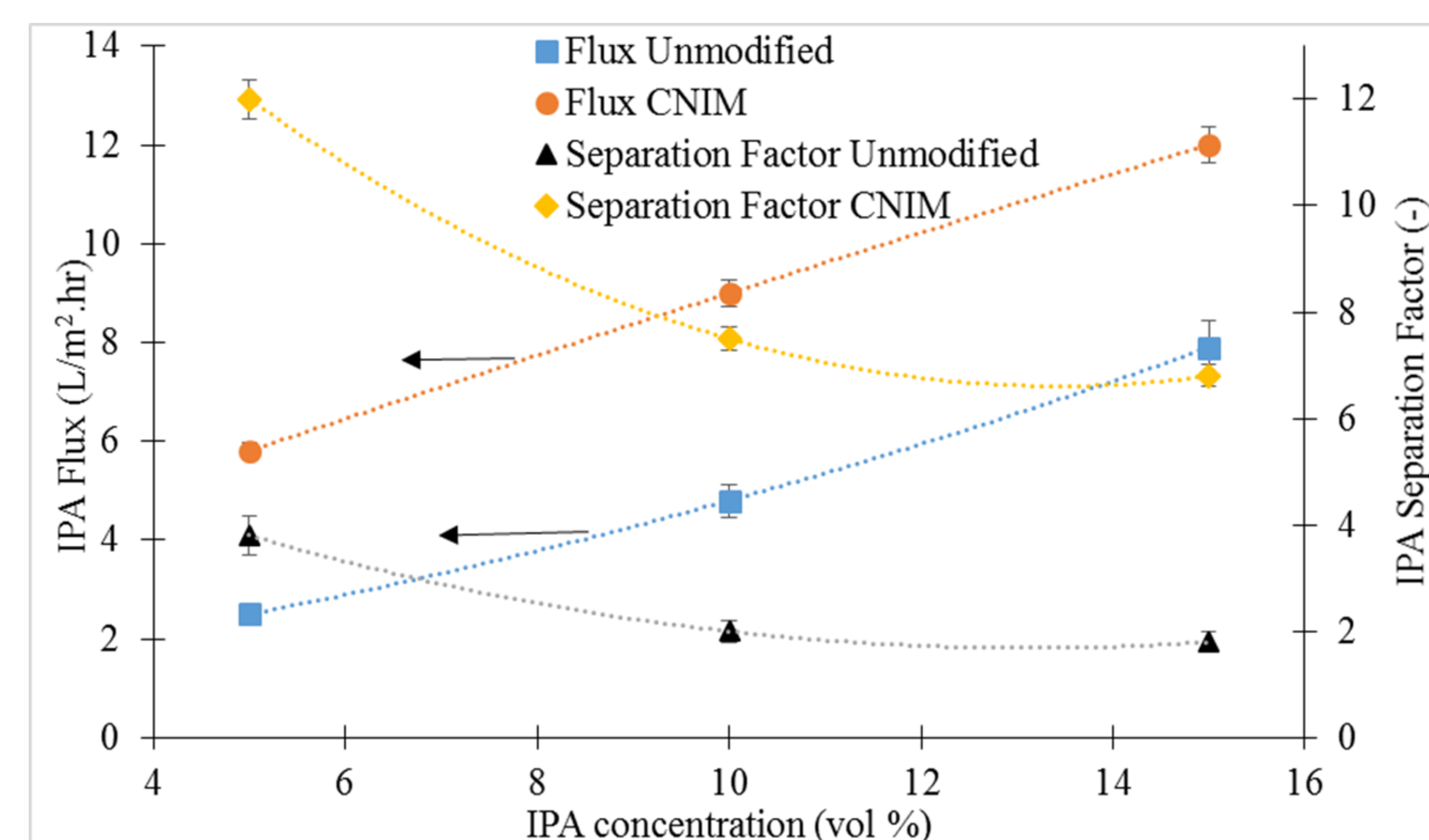
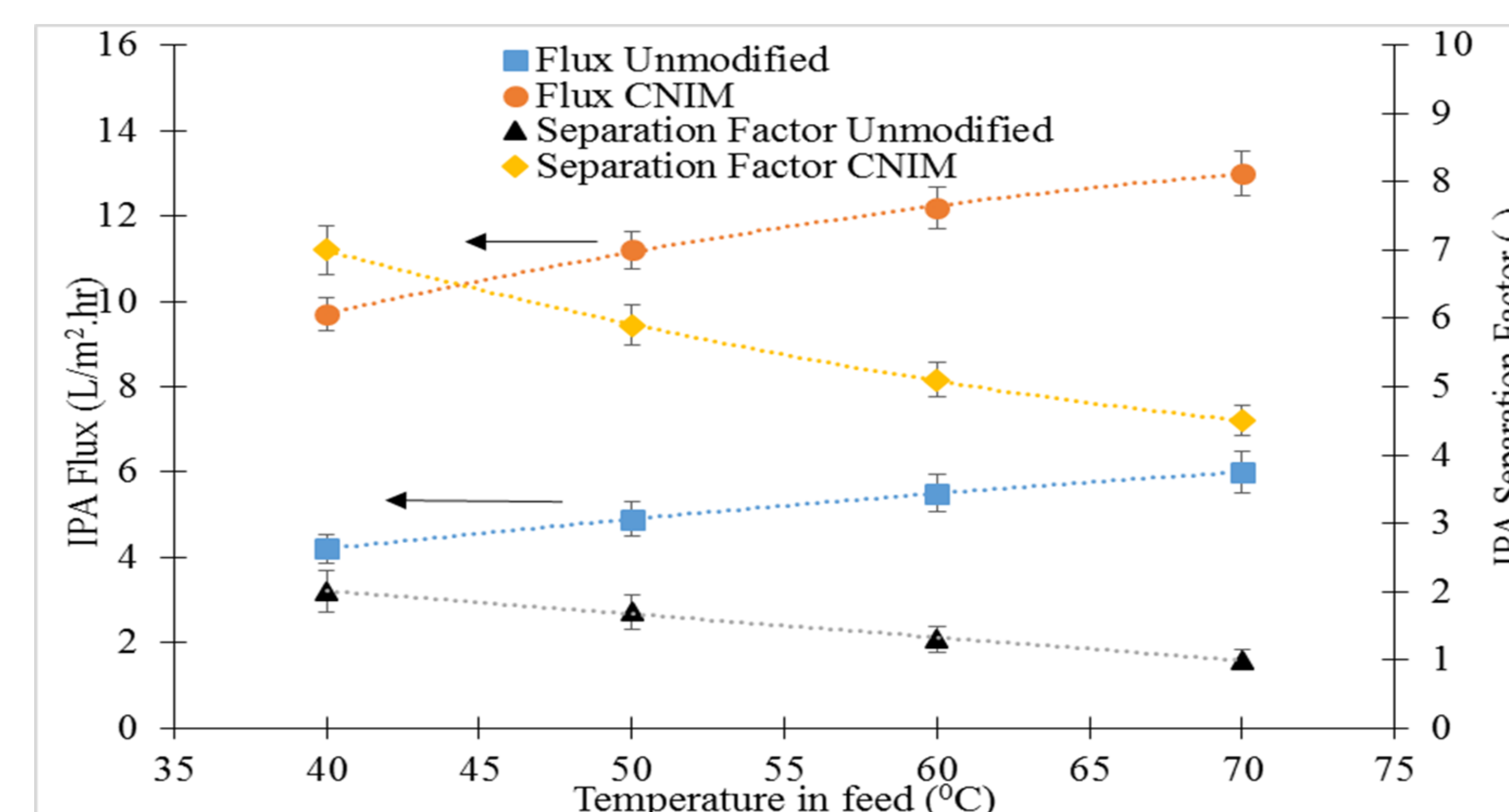


Fig 5: Flux & Separation Factor vs (a) Concentration and (b) temperature



Membrane Characterization

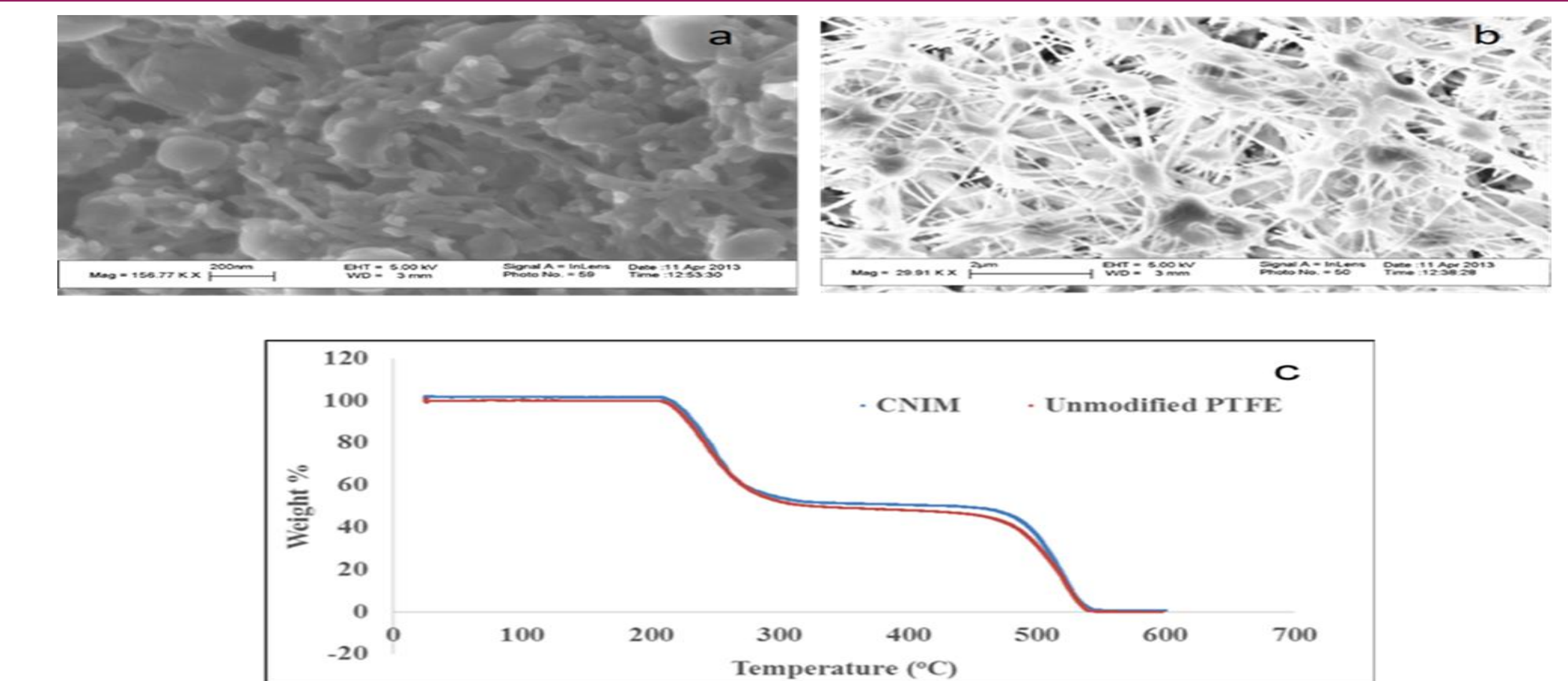
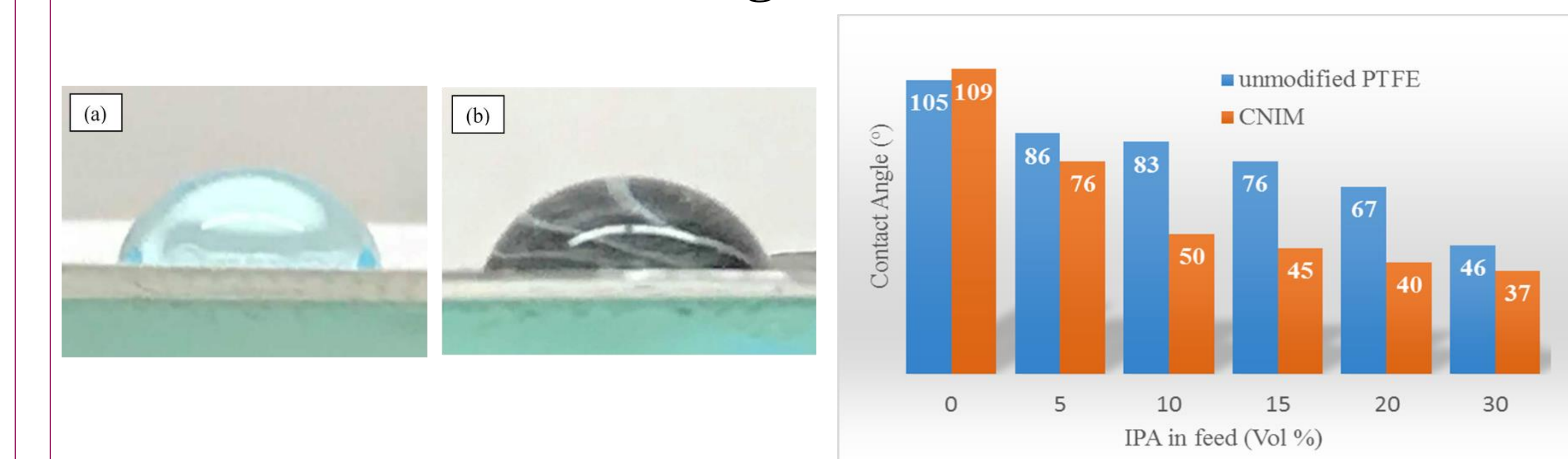


Fig 6: Scanning Electron Micrograph of (a) CNIM and (b) unmodified PTFE (c) thermogravimetric analysis of PTFE and CNIM and contact angles



Results & Conclusions

- The flux and separation factor enhancement reached as high as 200% and 225% respectively at 10% IPA in feed
- Enhancement in feed flux obtained was 160% at 60 °C and the corresponding enhancement in separation factor reached as high as 400% at the same temperature
- The flux obtained with CNIM was over 5 times higher than what has been reported before
- An increase in mass transfer coefficient of about 132% was also observed at 40 °C

Acknowledgements

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