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THERMODYNAMICS OF CYCLOPENTANE HYDRATES FORMATION FROM BRINE: EXPERIMENTAL AND MODELLING STUDY

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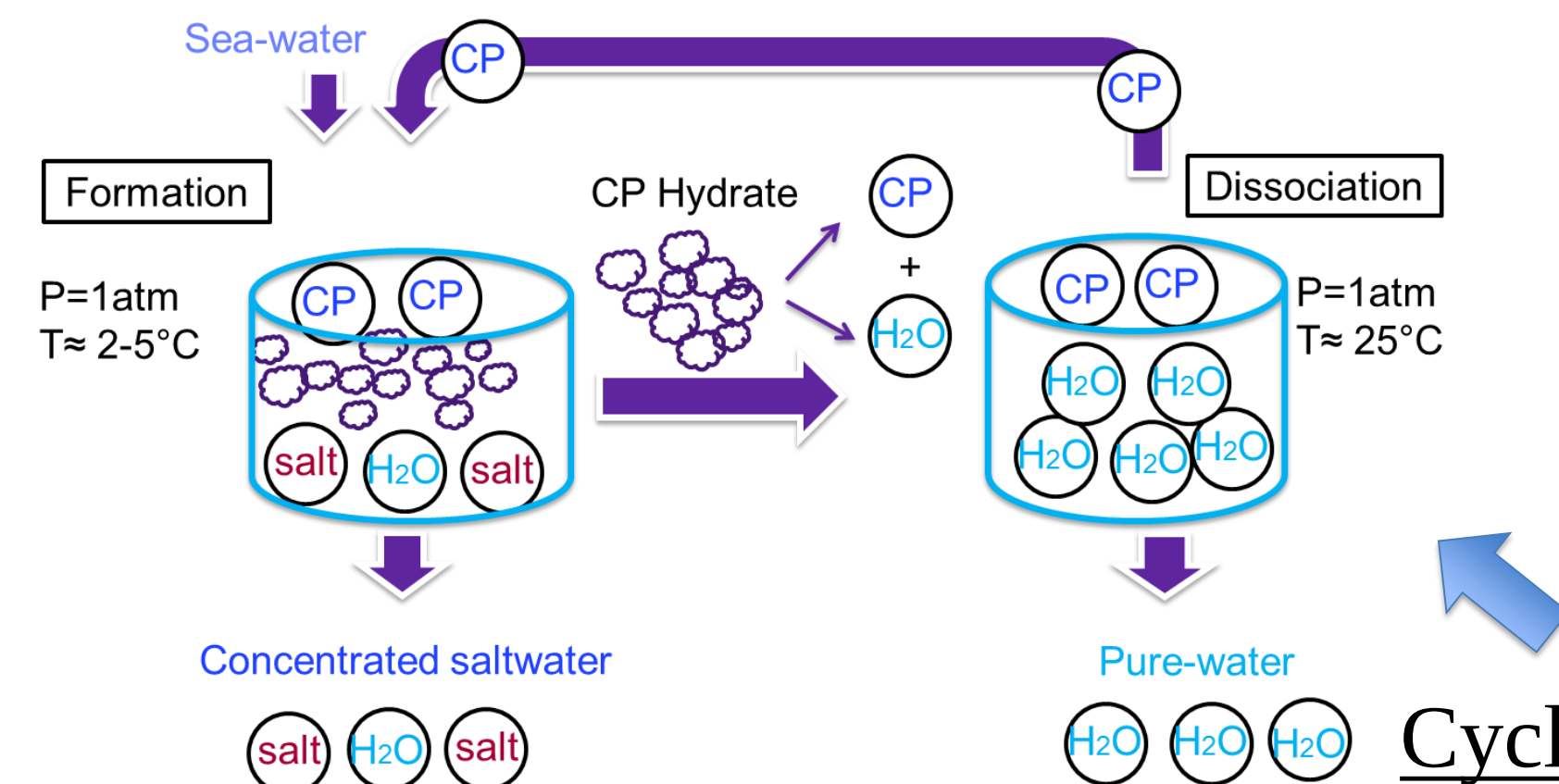
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Introduction

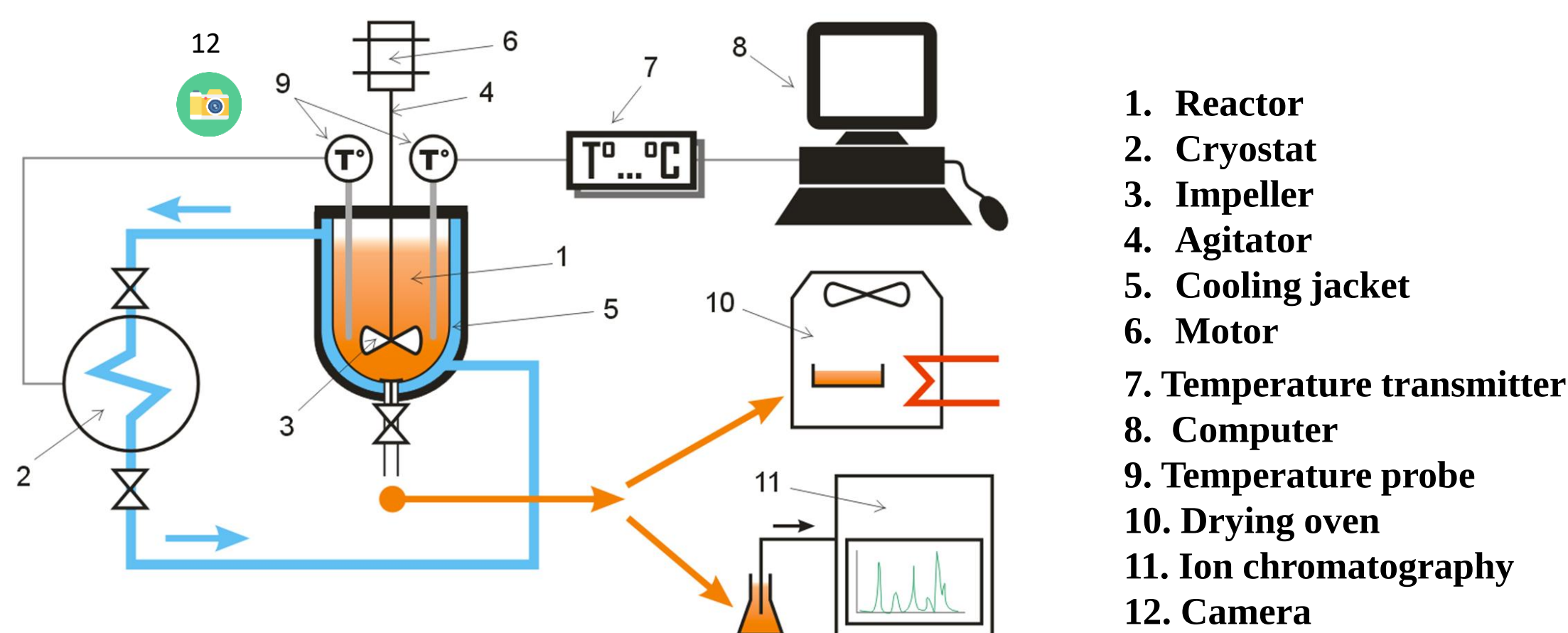
Hydrates can be used to remove salt from saline water or to clean water as a purification method



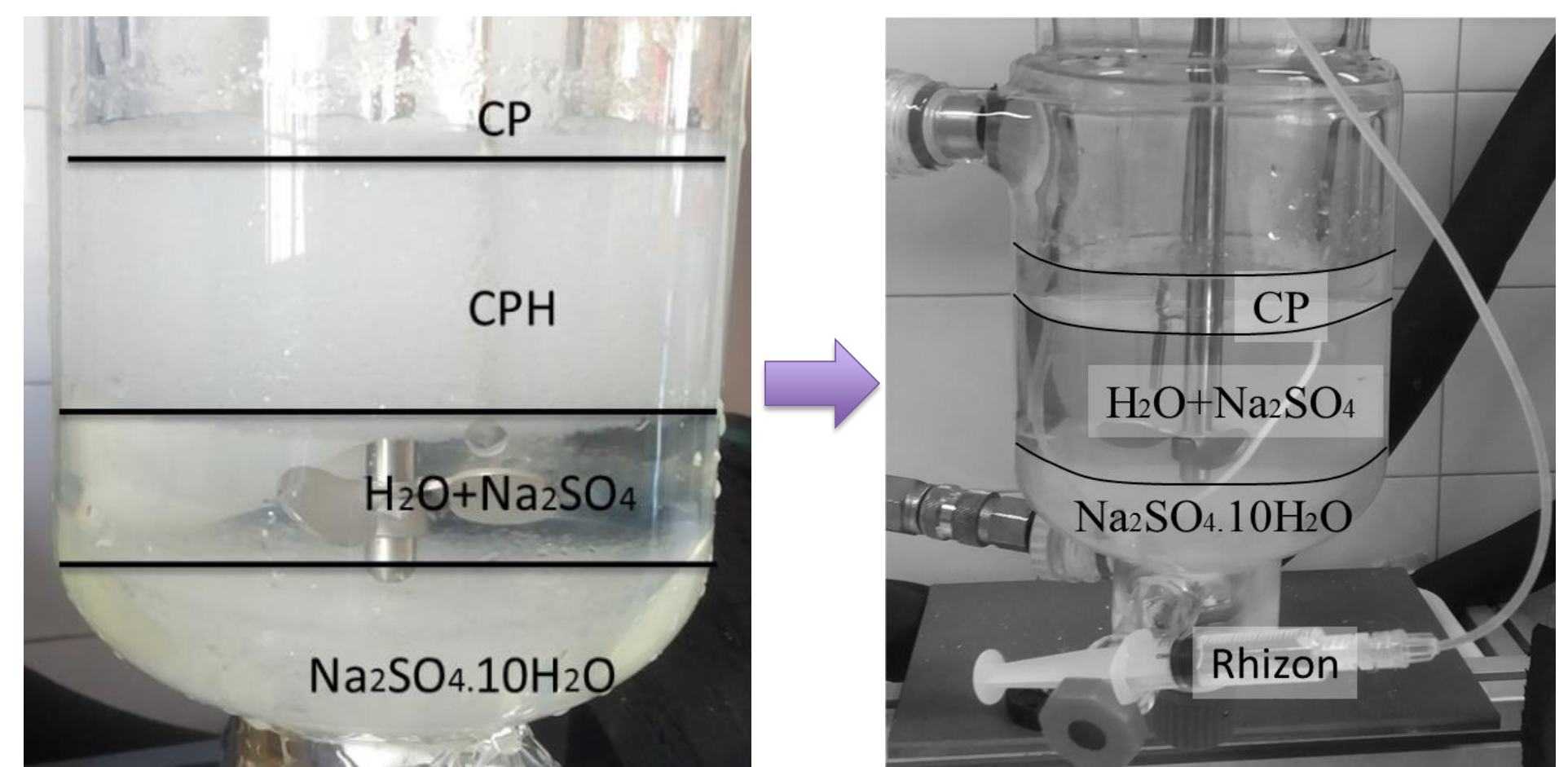
Objective

- ❖ NaCl, KCl, NaCl-KCl, CaCl₂, Na₂SO₄, MgCl₂, MgCl₂-NaCl, MgCl₂-NaCl-KCl at different concentrations
- ❖ Develop four models based on Standard Freezing Point Depression (SFPD) equation, Hu-Lee-Sum (HLS) correlation, Kihara and Activity-Based Occupancy Correlation (ABOC) to predict the equilibrium conditions.

Apparatus



Experimental observation

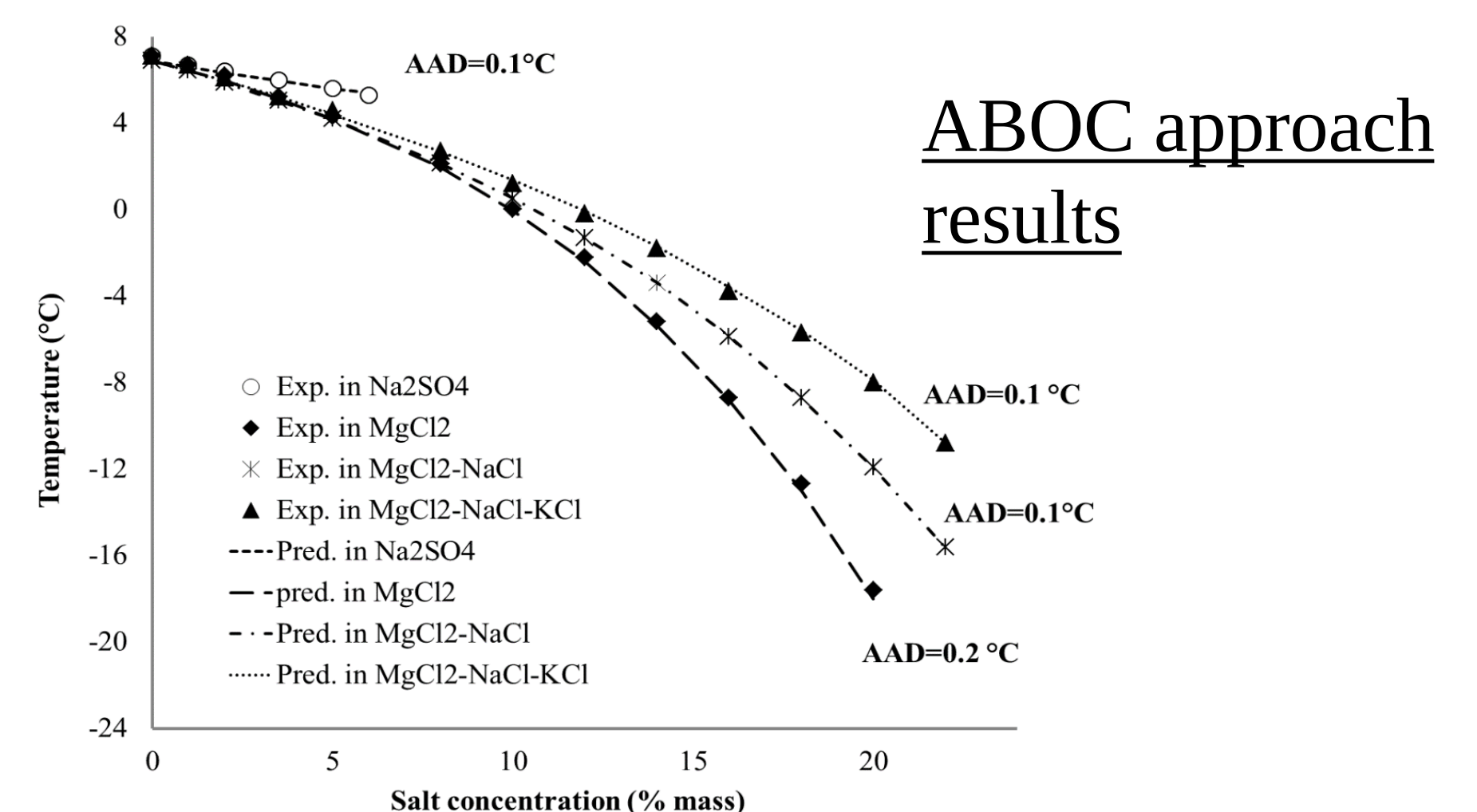


Up to eutectic point and salt co-precipitation !

Thermodynamic data and Modelling

- ❖ 4 thermodynamic approaches:
 - Standard Freezing Point Depression (SFPD)
 - Hu-Lee-Sum correlation
 - Kihara approach
 - Activity-Based Occupancy Correlation (ABOC)

$\theta(a_w) = m \times (a_w^2) + n \times (a_w) + p$
occupancy of cavities correlated to water activity



Conclusions

- ❖ Phase equilibrium data of CP hydrates in saline systems were determined.
- ❖ Simulated results agree well with the experimental equilibrium data
- ❖ Model predictions within 0.2°C accuracy

Ho-Van, S. et al., AIChE Journal 64(6) (2018)

Ho-Van, S. et al., Industrial & Engineering Chemistry Research 57(43) (2018)