Kinetic modelling of methane hydrate formation and agglomeration with and without anti-agglomerants from emulsion in pipelines

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To cite this version:


HAL Id: emse-01267489
https://hal-emse.ccsd.cnrs.fr/emse-01267489
Submitted on 15 Feb 2016
**Introduction**

- Offshore systems mainly containing crude oil, natural gas and water operate at low temperature and high pressure which favour conditions for gas hydrate formation and agglomeration.
- Gas hydrate is a serious issue in flow assurance; it may cause many troubles, especially, plugging in oil and gas pipeline.

**Experimental Method**

- Emulsions formed by water and oil (Kerdane®) are charged into flow loop with and without anti-agglomerants (AAs-LDH1) to study rheology.
- The system is cooled down 4-5°C and pressed up to 80 bar by the injection of methane for gas hydrate formation and agglomeration study.
- Probes used: Particle Video Microscope (PVM), Focus Beam Reflectance Measurement (FBRM) and Attenuated Total Reflection – Infrared (ATR-FTIR)

**Mean Droplet Size Model**

**Objective**

- Intend to develop a kinetic model to predict gas hydrate formation, agglomeration and plugging in flowlines based on the experimental data obtained from Archimede Flowloop from the work of Mendes-Melchuna (2015).
- A preliminary study of the emulsion formation and behaviour will contribute to a better understanding of the hydrates formation and agglomeration.

**Experimental Apparatus (Archimede Flowloop)**

**Conclusions & Perspectives**

- Mean droplet size of emulsion is a key factor for kinetics of gas hydrate formation and agglomeration in oil and gas pipelines.
- This mean droplet diameter model will be further studied to better match with higher water cut and in the presence of AAs-LDH1 using dimensionless parameters (Reynolds and Weber numbers).
- Future work will focus on developing model of gas hydrate formation and agglomeration in flowlines.

**References**

Melchuna, Ana Camirao, Jean-Michel HERRI, 2015, Topological modeling of methane hydrate crystallisation fronts on methane-water mix with high salinity, Fluid Phase Equilibria (accepted)


**Acknowledgment**

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