Literature VLE Data for CO2-Based Mixtures Relevant to CO2 Capture and Storage: Update on the Existing Gaps and Performance Evaluation of Selected EOS

Nima Razmjoo[1, S] and Manuele Gatti[1, C]

[1]*Politecnico di Milano, Milano, Italy*
manuele.gatti@polimi.it

In CO_2 transport networks for CO_2 Capture and Storage (CCS) applications, the accurate estimation of the bubble and dew point of the CO_2-rich streams is important both for optimizing the transport conditions, as well as for avoiding two-phase formation which may cause operational issues (e.g., corrosion or increased pressure drops).

In this work, the database of available experimental VLE data of CO_2 mixtures relevant to CO_2 transport is updated and critically discussed in order to:

• present an updated overview of the VLE gaps, both for binaries, which are crucial for EOS models calibration, and for multicomponent mixtures, to evaluate the performance of different EOS for phase envelope prediction;

• plan new VLE campaigns to be performed in the framework of the ongoing ENCASE research project, starting from the most relevant ones for CCS development;

• perform a calibration (where needed) and comparison of different categories of Equations of State, such as multiparameter Helmholtz-energy ones, advanced cubic models (Peng-Robinson with different mixing rules based on Wilson, Van Laar or NRTL as activity coefficient model) and SAFT-type models.

The impurities included in the CO_2-based mixtures will include at least the following species: H_2O, N_2, O_2, Ar, H_2, CO, CH_4, C_2H_6, C_3H_8, NO, NO_2, NH_3, H_2S, SO_2, MEA.

Acknowledgments

This work is conducted within the ENCASE project which has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N^{o} 101094664.