PHASE BEHAVIOR FOR DECALIN, WATER AND CARBON DIOXIDE MIXTURES

Inaura Rocha[(1)]*, Rosana Fialho[(1)], Claudio Dariva[(2)], Elton Franceschi[(2)], José Marques [(3)] and Fernando Pessoa[(4)]

(1) Programa de Pós-Graduação em Engenharia Industrial, Universidade Federal da Bahia 40210-630, BA, BRAZIL

(2) Programa de Pós-Graduação em Engenharia de Processos, Universidade Tiradentes 49032-490, SE, BRAZIL

(3) Departamento de Engenharia Química, Universidade Federal de Sergipe 49100-000, SE, BRAZIL

(4) Escola de Química, Universidade Federal do Rio de Janeiro 21945-970, RJ, BRAZIL

Phase behavior of hydrocarbon, water and carbon dioxide systems is relevant in many areas of the petrochemical industry as in the oil reservoir behavior and in the design of transport and separation equipments. Besides many oil reservoirs present a high content of carbon dioxide, there is a growing interest in the use of CO_2 in EOR (Enhanced Oil Recovery) methods. In this sense, the knowledge of the phase behavior of systems with CO_2 and representative components of oil through experimental measurements and using thermodynamic models is of primary importance. This work is focused on the study of the phase behavior for the decalin/water/carbon dioxide ($C_{10}H_{18}$+H_2O+CO_2) ternary system in a temperature range from 313 to 333 K. The experiments were conducted in a high-pressure variable volume view cell, from where the phase transitions were obtained using a static synthetic method. The influence of the global water content in the mixture was also evaluated (1, 5 and 10% w/w H_2O: $C_{10}H_{18}$). Phase diagrams of pressure transition in function of composition of the carbon dioxide were constructed for each water content and the results indicated pressure transitions up to 200 bar in the experimental range investigated. Also, depending on the global composition of the system, distinct phase transition types like bubble and dew point transitions were observed in vapor-liquid, liquid-liquid and vapor-liquid- liquid phase separations.

Keywords: Carbon dioxide, water, decalin, synthetic method, phase behavior.

*Corresponding author: rosanafialho@ufba.br