

Solubility of camphene and caryophyllene oxide in subcritical and supercritical carbon dioxide

ABSTRACT

The solubility of camphene and caryophyllene oxide in subcritical and supercritical carbon dioxide were determined using dynamic off-line analysis method. Under subcritical condition, solubility of camphene and caryophyllene oxide were $(1.738 \text{ to } 18.118) \cdot 10^{-3}$ and $(1.84 \text{ to } 7.872) \cdot 10^{-3}$ respectively at 298.15 K with pressure varied from 50 to 70 bar. At 302.15 K and under same pressure variation, solubility of camphene and caryophyllene oxide were $(1.918 \text{ to } 18.76) \cdot 10^{-3}$ and $(14 \text{ to } 25.624) \cdot 10^{-3}$ respectively. Under supercritical condition, experiments were run from 80 bar to 250 bar. Solubility of camphene was ranged from $(54.024 \text{ to } 151.67) \cdot 10^{-3}$ at 308.15K and $(17.552 \text{ to } 65.487) \cdot 10^{-3}$ at 313.15 K; while solubility of caryophyllene oxide was ranged from $(24.9 \text{ to } 299.94) \cdot 10^{-3}$ at 308.15 K and $(2.542 \text{ to } 102.359) \cdot 10^{-3}$ at 318.15 K. These solubility data was correlated with three semi-empirical models which were Bartle, Chrastil and Mendez-Santiago-Teja model. Of these three models, Mendez-Santiago-Teja model showed excellent fitting with average absolute relative deviation kept below 2%.

Keyword: Solubility; Supercritical; Subcritical; Carbon dioxide; Camphene; Caryophyllene oxide