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Abstract

The research studies preparation of microencapsulation of paraffin wax by sulphur or sulphur-paraffin wax microencapsulation (SP-M) in the spherical shape by Rapid Expansion of Supercritical Solutions (RESS) method. Supercritical Carbon Dioxide (scCO₂) was used as a supercritical solvent. Sulphur-paraffin wax-scCO₂ solution is spraying through a nozzle to an aqueous solution of 15 v/v% of ethylene glycol (EG). The effect of saturated of initial sulphur and paraffin wax, saturated time, the initial mass composition of sulphur and pre-expansion pressure on SP-M particle size, morphology and mass composition of sulphur on its surface were investigated. Particle size and morphology was observed by using Scanning Electron Microscope (SEM). Surface element was analyzed by Energy Dispersive X-Ray Fluorescence Spectrometer (EDX). At the constant pre-expansion temperature of 90 °C, the experimental results revealed that SP-M with the spherical shape can be prepared and the average particle sizes were found to be 4.5 - 8.5 µm and the percentage sulphur mass composition on SP-M surface were found that 16.97 - 28.00 w/w% depending upon the experimental conditions. The saturated of the initial solute effect to SP-M particle size decreases and sulphur composition on its surface was increased. By increasing saturated time of 20 - 120 min and pre-expansion pressure 120-180 bar resulted in decreasing of the particle size. By increasing of the initial mass content of sulphur 30-60 w/w% affect to SP-M particle size reduction. However, it found that sulphur mass composition on SP-M surface was increased. The content of 30 and 40 w/w% found that with the deposition coating and the content of 50 and 60 w/w% can be prepared SP-M with the completely of encapsulation coating. It could describe by nucleation and growth rate effect that significant related to sulphur and paraffin wax diffusivity and solubility in scCO₂.