

Deacidification of palm oil using supercritical carbon dioxide extraction

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Supercritical carbon dioxide (scCO₂) has been widely used in various processes in manufacturing oil, such as extraction, deacidification, degumming, bleaching and fractionation. Among these processes, deacidification is very important process not only for consumer acceptance, but also for the price and quality of products. The objective of this research is to recycle waste cooking oils by reducing free fatty acid (FFA) using scCO₂ extraction. Acid value, an index of FFA content in oil, should be below 0.2 for the oil to be edible. In this study, palm oil was fractionated using scCO₂ in a semi batch extraction apparatus. The purification was carried out at various experimental conditions including extraction time (1-7 h), temperature (313.15-373.15 K), pressure (20-35 MPa), and carbon dioxide flow rate (10-40 g CO₂/min). At 20 MPa, the acid value decreased from 0.49 to 0.13 with an increase in the temperature from 313.15 to 373.15 K. At 353.15 K, the acid value decreased from 0.54 to 0.14 as increasing the pressure from 35 to 20 MPa. At conditions of 353.15 K, 20 MPa, 40 g CO₂/min flow rate, and 3 h, the acid value decreased below 0.2 and recovering yield of purified oil was 80 %.