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Abstract	:	The experimental conditions of supercritical carbon dioxide (scCO₂) extraction of virgin palm oil (VPO) from oil palm mesocarp fiber (OPMF) were optimized using the Response Surface Methodology (RSM). Results showed that a maximum of 28.68 % of VPO extraction was obtained at the optimal experimental conditions of scCO₂ extraction: pressure of 31 MPa, temperature of 340 K, and extraction time of 80 min. The second-order rate equation, Arrhenius equation and Eyring theory were employed to assess the kinetics behaviour, activation energy and thermodynamics behaviour of scCO₂ extraction of VPO from oil palm mesocarp fiber. The lower activation energy value (12.17 kJ/mol) of scCO₂ for the extraction of VPO from OPMF indicates that the scCO₂ extraction technology is less dependent on temperature during the extraction of VPO from OPMF. The physicochemical properties and fatty acids compositions analyses reveal that the scCO₂ extracted VPO contains high carotenoids content (982 µg/g), low free fatty acids content (0.31 wt%), higher oxidative stability and higher unsaturated fatty acids content.