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Effects of Small and Large Molecule Emulsifiers on the Characteristics of β -Carotene Nanoemulsions Prepared by High Pressure Homogenization

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Summary

Oil-in-water (O/W) nanoemulsion allows the preparation of lipophilic nutrients such as carotenoids in liquid form, which may improve their bioavailability and broaden applications. In the present study, polyoxyethylene sorbitan monolaurate (Tween 20, TW-20), decaglycerol monolaurate (DML), octenyl succinate starch (OSS), whey protein isolate (WPI), and finally a blend of TW-20 and WPI (1 % by mass) have been tested for the preparation of β -carotene nanoemulsions. Interfacial tension, droplet size, zeta potential, microstructures observed by atomic force microscopy (AFM), stability of the emulsion and β -carotene have been compared. Results show that nanoemulsions stabilized with TW-20 and DML had smaller droplet size, but relatively poorer stability, compared with the ones stabilized with OSS and WPI ($p < 0.05$). WPI was able to protect β -carotene effectively from degradation, whereas OSS was not when emulsions were stored at 55 °C for 12 days. When a blend of TW-20 and WPI was used, the stability of nanoemulsions was significantly improved ($p < 0.05$). However, no significant effect of the mixed emulsifiers was found on the stability of β -carotene in the emulsions ($p > 0.05$).

Key words: nanoemulsion, emulsifiers, β -carotene, droplet size, emulsion stability

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