DEVELOPMENT AND CHARACTERISATION OF GUM ARABIC-KAPPA CARRAGEENAN COMPOSITE FILM FOR HARD CAPSULE APPLICATION

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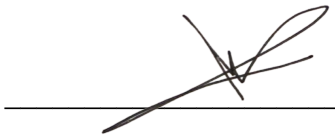

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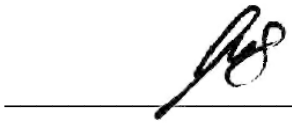

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ABSTRAK

Sekitar lebih 50% kapsul keras dihasilkan daripada gelatin haiwan yang bermungkinan membawa risiko penyakit haiwan dan sumber gelatin yang dilarang oleh agama. Kesedaran mengenai sumber gelatin ini telah mendorong banyak pembangunan kapsul keras alternatif baru yang berasaskan tumbuhan. Objektif kajian ini adalah untuk memformulasikan dan menghasilkan kapsul keras yang berpotensi daripada campuran gam arab dan semi refined kappa carrageenan. Komposit GA-SRC disediakan pada nisbah berat SRC yang berbeza iaitu 33% (GC33), 50% (GC50) dan 67% (GC67). Polyethylene glycol (PEG 400) dan alginate ditambah pada kepekatan yang sama. Sampel kawalan iaitu gam arab (GAF) dan semi refined kappa carrageenan (SRCF) telah dibandingkan dengan sampel komposit. Sifat-sifat sampel dicirikan untuk sifat mekanikal, morfologi permukaan, sifat haba dan masa disintegrasi. Elemen dan pencirian fungsi bahan mentah; gam arab dan semi refined kappa carrageenan telah menunjukkan keserasian untuk membentuk filem komposit melalui pembentukan ikatan hidrogen. GAF menunjukkan sifat rapuh dan permukaan morfologinya licin dengan beberapa retak. SCRF mempamerkan pengecutan dan mempunyai morfologi permukaan yang kasar dengan kekuatan tegangan, 25.51 MPa. Peningkatan SRC di dalam sampel komposit telah meningkatkan kelikatan larutan komposit, kekuatan tegangan dan gelung kapsul. Kapsul keras GC67 menunjukkan kekuatan tegangan dan gelung kapsul yang paling tinggi iaitu 36.21 MPa dan 34.11 N berikutan pada kelikatan larutan 1058 mPa.s. Kapsul keras ini disintegrasi pada 7.30 minit. Penambahan gam arab telah menghasilkan permukaan yang lebih licin. Oleh itu, GC67 berpotensi untuk pembangunan kapsul keras dan objektif kajian ini telah tercapai.

ABSTRACT

More than 50% of the hard capsule is manufactured from the animal gelatin, which may risk animal disease and religious prohibited source of gelatin. This awareness of gelatin source has driven many new alternative plant-based hard capsule developments. The present study's objective is to formulate and produce potential hard capsule from mixtures of gum arabic and semi refined kappa carrageenan. The GA-SRC composites were prepared at different SRC weight ratios of 33% (GC33), 50% (GC50) and 67% (GC67). Polyethylene glycol (PEG 400) and alginate have been added at constant concentration. The control films of gum arabic film (GAF) and semi refined kappa carrageenan film (SRCF) have been compared to the composites. Samples properties were characterised for its mechanical properties, surface morphologies, thermal properties and disintegration time. The raw material elemental and functional characterisation of GA and SRC suggested a compatibility to form composites through hydrogen bonding formation. GAF demonstrated brittle property and has smooth surface morphology with some cracks. SCRF exhibited shrinkage and has a rough surface morphology with the tensile strength of around 25.51 MPa. The increment of SRC in composite films has increased the composite solution viscosity, tensile strength and capsule loop. The hard capsule formed from sample GC67 shows the highest tensile strength and capsule loop of 36.21 MPa and 34.11 N respectively at 1058 mPa.s solution viscosity. It was determined that the hard capsule disintegrated at 7.30 minutes. The addition of gum arabic was able to make the hard capsule film surface smoother. Thus, GC67 is potential for the development of hard capsule, and the objective of this research was achieved.

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