

**PHYSICAL STABILITY AND IN VITRO SUN PROTECTION FACTOR (SPF)
OF EMULSION CONTAINING NATURAL OIL AND ROASTED BARLEY
(*Hordeum vulgare* L.) EXTRACT**

ABSTRACT

An emulsion containing either chemical absorbers or physical blockers is commonly used to prevent the ultraviolet (UV) radiation from reaching human skin which causing aging, sunburn, and skin cancer. Several natural substances have been recently considered as potential sunscreen resources due to their UV absorption property. This study aimed to evaluate the UV absorbance spectroscopy and sun protective factor (SPF) of roasted barley (*Hordeum vulgare* L.) and natural oils (coconut, avocado, olive, sweet almond, perilla seed oil virgin oils, and *Camellia oleifera* seed oil) to be formulated cosmetic emulsion by compared with the chemical absorber, oxybenzone. The SPF, emulsion stability, and physical characteristics were observed by the heating-cooling cycle. Furthermore, thermal degradation and photooxidation effect on the formulated cosmetic emulsion were examined under accelerated conditions for 28 days storage to estimate the half-life. The results found that all of the natural oils and roasted barley presented the moderately to strongly UV absorption spectrum profile which the virgin perilla seed oil (VPSO) or Nga-Mon provided the most capableness UVB absorber with the highest SPF. The combined between roasted and oxybenzone in the VPSO formulation can promote the board range of UV protection covering both UVA and UVB radiation and it showed the potential to resist a denature of SPF capability by heating-cooling stability test better than oxybenzone alone. Phase separation was not observed after six repeated cycles, the firmness and homogeneity were insignificantly changed. Thus, mixed emulsifiers of Tween 80 and Span 80 can stabilize an emulsion. The SPF reduction was perceived after storage under the varying temperature and light conditions, 45°C / light, and 30°C / light, but not in the 30°C / dark condition. The effect of thermal degradation and photodegradation were followed apparent first-order kinetics, half-life time ($t_{1/2}$) of SPF was 415.89 days when kept at 30°C / dark condition.

KEY WORDS: Roasted barley / natural oil / sun protection factor (SPF) / cosmetic emulsion / emulsion stability