CHAPTER V

CONCLUSIONS

Rice bran is a by product of rice mill industry that is rich in vitamins, minerals, amino acids, essential fatty acids and antioxidant nutrients. Rice bran is often discarded because of rancidity created by hydrolysis of oil. Present experiments were directed towards finding and comparing RBO from various production methods for increasing the value of the rice bran by potential utilization of the by-product material. The study was focused on determining the effect of production methods on free radical scavenging, content of γ-oryzanol, vitamin E, oxidative stability, and kinetic stability in various RBO. Moreover, the study included the evaluation properties of oil-in-water emulsions containing RBO from various production methods in term of physical stability and sensory evaluation.

Five different samples of RE-RBO, SE-RBO, BSE-RBO, CP-RBO and BCP-RBO from different production methods were determined and selected the best one in the production of RBO for cosmetic material which could be concluded as follows Table 23.

Sample	γ-oryzanol (ppm)	Vitamin E (ppm)	IC_{50} (mg/mL)	Induction time (h)	Ea (kcal/mol)	$T_{1/2}$ t 32 °C (day)
RE-RBO	3487.03	170.56	4.53	3.69	3.97	136.14
SE-RBO	14614.37	442.83	2.23	9.93	5.35	151.97
BSE-RBO	13199.41	350.94	2.46	0.48	5.09	268.60
CP-RBO	13917.92	527.83	2.29	9.39	5.08	159.67
BCP-RBO	12855.82	357.57	2.59	2.86	4.02	181.90

Table 23 Results of RBO from various production methods

1. Both of bleaching step and refining step of RBO production method were affected to color in the RBO whilst, RE-RBO was less color than other RBO.

2. There were no significant differences ($P>0.05$) in free radical scavenging among SE-RBO, BSE-RBO, CP-RBO and BCP-RBO except RE-RBO, which was significantly lower ($P<0.05$) in term of DPPH scavenging activity.

3. The amount of γ-oryzanol and α-tocopherol content in RBO were affected by different production methods. The highest γ-oryzanol was found in SE-RBO and the highest vitamin E was found in CP-RBO.

4. The difference in induction time for the different production methods was significant ($P<0.05$). This indicated that processing steps were affected to oxidative stability of RBO.

5. This study found that the degradation of γ-oryzanol in RBO obeyed the first-order kinetic. The rate constant and activation energy of the reaction at different temperatures may be used to predict retained amount of the compound during the storage temperature processing. Moreover, the different production methods give the different half-life of γ-oryzanol in RBO.

6. All various RBO emulsions were approximately in an acceptable range of skin pH (5-6).

7. The difference in viscosities of RBO emulsions from various production methods was significant ($P<0.05$). This would tend to indicate that processing steps were affected to viscosity of RBO emulsions. RE-RBO emulsions gave the highest viscosity follow by BCP-RBO, CP-BO, BSE-RBO, and SE-RBO emulsions.

8. RE-RBO was evaluated as the most 'satisfy' with its color and spreadability. CP-RBO was evaluated as the most 'satisfy' with skin feel and BCP-RBO was evaluated as the most 'satisfy' with odor and smooth cream mass. On the other hand, SE-RBO got the least score in all categories.

9. Differences in physical stability testing in term pH of oil-in-water emulsions before and after heating-cooling cycles were significant ($P<0.05$) for all formulation. The results indicated that heating-cooling cycle affected pH in all various RBO emulsions.

10. Differences in physical stability testing in term viscosity of oil-in-water emulsions before and after heating-cooling cycles were not significant ($P>0.05$) for all formulation. The results indicated that heating-cooling cycle did not affected to physical stability in term of viscosity in all various RBO emulsions.