

## CHAPTER 5

### CONCLUSION

From antioxidant activity studies, three commercial extracts had been selected – French maritime pine bark extract (PBE), red wine extract (RWE) and grape seed extract (GSE) due to their considerable potent activities on both DPPH method and TBARS method. According to TLC chromatograms developed with hexane/ethyl acetate/formic acid (4:2:1, v/v/v), polyphenolic compounds – procyanidins were the active components of those three extracts where GSE also consisted of alpha-tocopherol and at least two more antioxidants. After conducted to six cycles of heating-cooling (H/C) cycling, RWE and GSE revealed unchanged in DPPH scavenging activity but significantly reduced in PBE activity ( $p < 0.05$ ).

The selected extracts were incorporated into O/W serum base which PBE and RWE as solid powders had to be dissolved in propylene glycol before combination where GSE as liquid could be instantly mixed to the base formula. All those extracts affected color of the products; PBE gave the orange color, RWE gave the dark brown color, and GSE gave the light yellow color. Since PBE serum and RWE serum presented unpleasant dark color, and moreover RWE serum showed slightly irritation in rabbit skin primary irritation study, thus GSE serum with lighter color was more appropriate for cosmetic application.

GSE serum was physically stable after storage in four conditions of stability test; room temperature, cool place (4°C), hot place (45°C) for four months, and H/C cycling for six cycles. Furthermore, GSE serum performed higher antioxidant

activities (DPPH method and TBARS method) than serum base both before and after stability test ( $p < 0.05$ ). However, its activities were significantly decreased at hot temperature which indicated that GSE serum was sensitive to heat, so the product should be prevented from heat for its good effectiveness.

According to the clinical studies, GSE serum and serum base were compatible to human skin (without skin irritation or allergic reaction). After 6 weeks of application, treated with GSE serum improved forearm skin by significantly reducing in all four anti-wrinkle parameters; surface, volume, Ra and Rz. Placebo site (serum base) improved in surface, Ra and Rz while none of development occurred in untreated area (intact skin) ( $p < 0.01$ ). The wrinkle reducing capacity as % efficiency of GSE serum and serum base produced statistically improvement for all parameters against untreated area. The efficiency of GSE serum was also higher than serum base among all indicators, but significantly in the volume parameter ( $p < 0.05$ ). These results implied that serum base also had anti-wrinkle effects, though GSE serum which performed more development for the volume parameter could have the higher effect on filling the bottom of the wrinkles, and this effect should be provided by OPCs, alpha-tocopherol and the other antioxidants consisting in GSE.

In conclusion, the grape seed extract, containing procyanidins and vitamin E, with skin compatibility and good wrinkle reducing capacity is an interesting natural substance for anti-wrinkle cosmetics.