

CHAPTER V



CONCLUSION

The area of microemulsion using Tween 20, Tween 80, Solutol[®] HS15 and Cremophor[®] EL as surfactant were decreased when adding glycerol as cosurfactant in systems. Propylene glycol and Imwitor[®] 308 acted as the cosurfactants which had ability to increase microemulsion formation when used with surfactant. Moreover, Imwitor[®] 308 was more potential cosurfactant than propylene glycol. The microemulsion area of systems containing all surfactants and Imwitor[®] 308 at weight ratio of 4:1 (and 2:1 for Tween 20 and Tween 80) showed the higher microemulsion area compared to systems using the same surfactant and different cosurfactant. The result of phase behavior investigation was that the systems which could form high microemulsion area and maximum oil solubilization were system solubilized with 2:1 Tween 20 or Tween 80 to Imwitor[®] 308 and 4:1 surfactant (Tween 20, Tween 80, Solutol[®] HS15 or Cremophor[®] EL) to Imwitor[®] 308. The area of microemulsion at 2:1 weight ratio of Tween 20 to Imwitor[®] 308 was the highest and microemulsion formulation tended to toward to water corner.

The particle size and particle size distribution of microemulsion in this study were small, especially for Tween 20 and Imwitor[®] 308 system, particle size was smaller

than 13 nm. Surprisingly, the particle size was increased when the system had higher oil solubilization. The polydispersity of all microemulsion systems was smaller than 1.

All surfactants using Imwitor[®] 308 as cosurfactant could provide the o/w microemulsion while Tween 20 system had higher o/w microemulsion area. The pH values of microemulsion in PBS prepared using 50 %w/w surfactant mixture, 2:1 weight ratio of Tween 20 to Imwitor[®] 308 were in range of 6-7, however, the osmolality of microemulsion was as high as 1,500-2,300 mOsm/kg.

For the hemolysis study, microemulsion containing 60% w/w surfactant mixture, 4:1 weight ratio of Cremophor[®] EL to Imwitor[®] 308 with 5% w/w oil allowed the least hemolytic activity compared to other microemulsions investigated. The hemolytic activity of microemulsion prepared from 50% w/w and 2:1 weight ratio of Tween 20 to Imwitor[®] 308 with 5, 10 and 15 %w/w oil seemed to be similar.

From the results, It was concluded that microemulsion containing Imwitor[®] 308 as cosurfactant and Tween 20 as surfactant showed ability to produce large area of o/w microemulsion existence, solubilize a high degree of oil. Hence, it could be used for parenteral delivery of lipophilic compounds (drugs, nutrients). The microemulsion was stable with dilution. The microemulsion presented Newtonian flow. Moreover, the hemolysis test of microemulsion to ensure of the safety of formulation after

administration showed a lower toxicity of microemulsion compared to corresponding micelle.

Suggestion for further study

The further studies are needed to determine the ability to solubilize the lipophilic compounds in microemulsion. *In vivo* study should be investigated further in animal in order to determine the toxicity of microemulsion when use in human body.