CHAPTER 4

DISCUSSION

From this work, the factors (buffer pH 3, 5.5, 7.4, chloroform and polymer loading) influenced to the enantioselectivity of release of propranolol enantiomers for the composite MIP cellulose membrane. The solvent and polymer loading affected the specific recognition properties of composite MIP membranes were demonstrated through in vitro release experiment using dialysis. Phosphate buffer pH 7.4 gives high enantioselectivity (see section 2.3.5.1). Chloroform was found to decrease the specific binding of propranolol enantiomer on imprinted polymer, as substrate hardy diffuse into the polymer (Spivak *et al.,* 2005). The affinity propranolol enantiomer to imprinted polymer enhances enantioselectivity of the membrane but enantioselectivity relates to capacity of binding between enantiomer and binding site.

The composite MIP microparticle membrane containing propranolol imprinted microspheres gives a high enantioselectively release for racemic propranolol in diffusion measurement and in vitro percutaneous penetration study. The selectivity facilitation mechanism for template release of the MIP microparticle composite membrane in the presence of racemic propranolol can be explained as that the affinity binding of the template enantiomer to the binding site, leaving the other enantiomer less strongly bound and therefore more readily released from the matrix into the solvent. When time progresses changes occur in the structure of the matrix, the enantiomers closest to the boundary of the swelling matrix are released.

The composite MIP microparticle membrane that racemic propranolol is loaded into donor phase has different mechanisms of enantioselective transport. When hydration of the polymer matrix, the changes in swelling of polymer in the matrix can be caused conformational reorganization of the polymeric structure. This may lead to the opening of the interconnecting pore, thus more binding sites are likely to become more accessible as swelling continues. The templates are released via selective pores which have accessible binding sites on their surfaces. The release and rebinding of template, exchange of template at the binding site, were occurred. When templates interacted with binding sites induce a shrink of binding site in MIP, hence

opening of gates for transport of template through the membrane were obtained (Suedee *et al.,* 2002).

The enantioselectivity of the composite MIP microparticle membrane in the presence of racemic propranolol was higher compared to the composite MIP microparticle membrane that racemic propranolol was loaded in the donor phase. This indicates greater opportunity for stereoselective interaction of propranolol enantiomer and MIP occurs during prepared process. The recognized enantiomer will preferentially occupy the selective receptor sites (Suedee *et al.,* 2002).

According to the enantioselective transport shown for the MIP grafted cellulose membrane, the template reacts selectively with the binding site into the membrane to produce a complex within the membrane. The complex between template and binding site were obtained and cannot diffuse from one side of the membrane to the other. Because of the binding sites fixed with the pore surface of membrane. Afterward the complex may encounter a second, decomplex binding site and template forms a complex with the second binding site after decompleation from the original one. Therefore, the template is passed from one binding site to the next. Only the enantiomer diffuses after enantioselective complexation and decomplexation reaction step by step through the membrane so called Tarzan swing mechanism. Such phenomenon must be reversible and fast enough and the binding site must be located very close to each other to transport of the enantiomers. Also an important factor is the adsorption of the enantiomer on the membrane (Hadic *et al.,* 2005).