CHAPTER V
CONCLUSION AND RECOMMENDATION

Single component adsorption isotherms for n-paraffin and n-olefin carbon number ranging form 6 to 20 were investigated on silicalite at 25 °C. Saturation capacities are the function of molecular chain length. Saturation capacities in term of molecules adsorbed per unit cell for both n-paraffin and n-olefin decrease with increasing carbon number, and the substantially decrease from carbon number 6 to 8. This is because of the difference in molecules configuration in the pore of silicalite of molecules carbon number 6 to 8. Saturation capacities in term of carbon atom adsorbed per unit cell, in contract, increase from carbon number 8, and reach the plateau after carbon number 14 on. This is attributed to the longer molecules that are more capability to blend and cross in the intersection of the silicalite pore channel than the shorter ones. As a result, the molecules are densely packed after carbon number 14 on. There is no significant difference between saturation capacities for n-paraffin and n-olefin at the same carbon number for single component adsorption on silicalite, indicating that saturation capacities for both n-paraffin and n-olefin depend just only on molecular chain length.

Binary competitive adsorption isotherms were studied for n-paraffin and n-olefin at the same carbon number on silicalite at 25 °C. The total saturation capacities obtained from the summation between the individual saturation capacities of n-paraffin and n-olefin are comparable with the saturation capacities in single component systems. From equilibrium selectivities, there is no separation between n-paraffin and n-olefin at the same carbon number by using silicalite as an absorbent. Pulse test experiments were studied for the multi-components feed mixture between n-paraffin and n-olefin carbon number ranging from 6 to 20 on silicalite at 120 °C. Dynamic selectivities were observed for the pulse test and the results agree with equilibrium selectivities, i.e. silicalite can not be used to separate n-paraffin and n-olefin at the same carbon number. However, there is possibility to separate n-paraffin and n-olefin at difference carbon number. The pulse test was also performed for NaX as an adsorbent, the dynamic selectivities for this case indicates that NaX can be used to separate n-paraffin and n-olefin. The explanation is that the

Na^+ in NaX zeolite has a specific interaction with C=C double bond in olefinic compound. Silicalite, on the other hand, does not have the particular function to interact with either n-paraffin or n-olefin, but the key factor for adsorption is molecular chain length; therefore, silicalite cannot separate n-paraffin and n-olefin at the same carbon number. The difference between silicalite and NaX is not only the Na cation that interacts with the double bond of olefin. It is due to the structure of zeolite, hydrophilic/hydrophobic and acid base interaction.

Energy simulation for the n-paraffin and n-olefin carbon number ranging from 6 to 10 were calculated through the straight pore of silicalite in order to determine the diffusion behavior of molecules into the pore of silicalite. Results show that all molecules move through the pore quite easy. In addition, n-paraffin and n-olefin at the same carbon number show the same energy level, indicating that there is the same diffusion behavior for n-paraffin and n-olefin at the same carbon number.