

CHAPTER V

CONCLUSION AND SUGGESTIONS

Conclusion

1. The epoxidized palm oil is synthesized from the refined palm oil that has the iodine value of 52 by the in situ peracetic acid epoxidation.
2. The 2⁴ factorial design is used to find the significance of reaction variables that affects the yield of the epoxidized palm oil.
3. The optimum conditions of the palm oil epoxidation are :
 - 3.1 The amount of 50% hydrogen peroxide 1.5 mole per mole of the unsaturation in palm oil.
 - 3.2 The amount of glacial acetic acid is 0.8 mole per mole of the unsaturation in palm oil.
 - 3.3 The quantity of concentrate sulfuric acid is 2% by weight of palm oil.
 - 3.4 The reaction temperature is 50-55°C.
 - 3.5 The agitation speed is 200 rpm.
 - 3.6 The reaction time is 8 hours.
4. The epoxidized palm oil contains the oxirane oxygen of 3.17% and the iodine value of 1.
5. The epoxidized palm oil can be used as the secondary plasticizer of the PVC as the other epoxidized oil.
 - 5.1 The efficiency of the epoxidized palm oil is lower than the commercial epoxidized soybean oil in thermal stability lower oxirane oxygen content. The epoxidized palm oil also migrates from the PVC compound easier than the epoxidized

soybean oil. The mechanical properties of the PVC that compounded with the epoxidized palm oil is equivalent to that of the epoxidized soybean oil. The PVC compounded with the epoxidized oil is softer and can better elongate than the PVC without the epoxidized oil (containing only DOP).

Suggestion

The stirring blade should be a teflon or glass because it is able to resist the acid corrosion throughout the reaction. The azeotrope system of hexane and water from the epoxidation reaction is an essential part for removal of the water from the reaction and for controlling the forward reaction to product. The Dean Stark trap is used for trapping the mixture of water and hexane that forms at the azeotropic temperature of 61°C . Since the azeotropic temperature is higher than the optimum reaction temperature, ($50\text{-}55^{\circ}\text{C}$) to affect the yield of the epoxidized oil. Therefore, the system is omitted.

The mechanical properties of the PVC compounded with the epoxidized palm oil are not so much different from that compounded with the epoxidized soybean oil, but the weathering test result is some different. The epoxidized palm oil should be studied about the thermal properties and the ability to stabilize PVC further more.