

6 Future Recommendations

As this is only a preliminary study, a few aspects need to be studied in more detail to confirm its feasibility in actual practice.

1. A more thorough experimental research needs to be carried out with crossflow filtration. The bench scale stirred-cell ultrafiltration as used in this study should be scaled up to the level of industrial ultrafiltration to give a more realistic picture of the membrane operation.
2. With a crossflow ultrafiltration operation plant, a more comprehensive study could be made on solute rejection characteristics of membrane ultrafiltration. Besides increasing the number of parameters to be investigated (parameters could include metal and non-metal constituents), more variations could be made on operating conditions such as temperature, flux rate, combination of different membrane modules and etc. This would definitely help in better understanding the advantages and shortcomings of membrane operation and the optimum operating conditions for such treatment.
3. The filter media used in this study was filter paper, which is not practical for use on actual industrial situation with high effluent capacity and high flow rate. A better choice of filter media would be granular-bed filter that can be operated at different filtration rates depending on effluent capacity.
4. An economic analysis is inevitable to calculate the costs involved, such as energy cost, installation and maintenance cost, price and life span of membrane modules and etc. Economic feasibility is one of the most important deciding factors in most industries.

With this, it is hoped that ultrafiltration technology will be a reality in palm oil mill effluent treatment in future.