

CHAPTER IV

CONCLUSION

From the proceeding results and discussion, the optimum conditions were utilized to search for the simple and efficient method for the rearrangement of epoxides by nickel reagents. The study was carried out in the homogeneous system by $\text{NiBr}_2 \cdot 3\text{H}_2\text{O}$ which was disclosed to be the most effective reagent on the epoxide rearrangement. The optimum conditions for the rearrangement of epoxides are styrene oxide 1 mmol as a substrate, $\text{NiBr}_2 \cdot 3\text{H}_2\text{O}$ 0.5 mmol as a reagent, THF 5 mL as a solvent at reflux temperature for 2 h. The quantitative yield of the corresponding phenylacetaldehyde was attained. Advantages of this method include the nature of the reagent, low cost, commercially available, rapid reaction rate and insensitivity to air and moisture.

The rearrangement study was also applied to other epoxides. Applications on the rearrangements of aryl-substituted epoxides were fruitfully achieved and gave the desired products in moderate to high yield with excellent selectivity. These aldehydes are used at industrial scale in fine chemistry for the production of the cosmetics and perfumery. As for the rearrangement of 1-dodecene oxide, cyclohexene oxide and methylcyclohexene oxide where such stabilization is absent bromohydrins are formed as the major products and carbonyl compounds are obtained in low yield, whereas for butyl glycidyl ether, *tert*-butyl glycidyl ether, phenyl glycidyl ether and epichlorohydrin, the oxygen atom on the epoxide ring is oriented far from the nickel atom causing inability of the rearrangement to produce aldehydes instead provided bromohydrin in high to excellent yield.

Propose for the future work

This research concerned with the methodology development for the rearrangement of epoxides by nickel reagents. The outcome opened many possibilities to deal with future exploration. A commercially available $\text{NiBr}_2 \cdot 3\text{H}_2\text{O}$ has never been utilized for the epoxides rearrangement, therefore the substitution of this reagent in the use of other reagent may provide other intriguing results in terms of product yield and selectivity. An one-pot procedure was reported for allylation and propargylation

of arylepoxides by a combination SnCl_2 of and catalytic $\text{Pd}(0)$ or $\text{Pd}(\text{II})$ with controlled water addition [90]. Leading to allyl and propargyl alcohols can be occurred *via* epoxide rearrangement-carbonyl addition reaction. The exploration of $\text{NiBr}_2 \cdot 3\text{H}_2\text{O}$ for the manipulation of these should be another interesting point. This present examination is a profitable example for the methodology in crucial chemical reaction nowadays, and may be the one of valuable chemical processes in the near future.