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Chapter 11

Homogeneous catalytic epoxidation of olefins

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1. Introduction

The homogeneous alkene epoxidation is a crucial reaction in organic chemistry that produces epoxides. It is frequently employed as a starting material and as a key intermediate in the organic synthesis [1,2]. Epoxides are involved in the nucleophilic ring opening, rearrangement, and reduction reactions that produce various functionalized compounds [3]. The epoxidation process has advanced over time due to its varied reactivity and combination with the biological characteristics of naturally existing products [4]. In most industrial operations, a non-catalytic process using organic peroxides, chlorine, and peracids is a common and traditional technology [5]. These procedures are not only inefficient but unfriendly to the environment, they furthermore generate waste, for example, during the non-catalytic process using chlorine, a significant amount of sewage containing chloride will be produced, and the usage of peracids will also producing a large amount of acid waste [6]. A classic example of the epoxidation of alkenes is carried out by using *m*-CPBA as an oxidant to produce epoxide and the *m*-chlorobenzoic acid leftover in this reaction (Fig. 11.1).

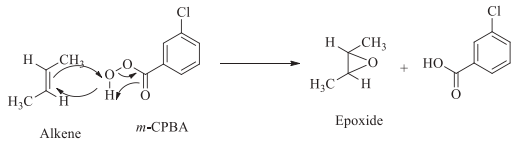

FIGURE 11.1 A classical epoxidation of an alkene with *m*-CPBA (oxidant).

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