

# Supporting Information

## **Farringtonite as an efficient catalyst for linear chain $\alpha$ -olefins epoxidation with aqueous hydrogen peroxide**

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### 1.1 An attempt of adding new 30% H<sub>2</sub>O<sub>2</sub> to improve 1-octene conversion

According to the almost unchanged trend for 21 to 24 h in 2.2.5, the fresh 30% H<sub>2</sub>O<sub>2</sub> was added into the 1-octene epoxidation reaction at 21 h. The results are shown in Table S1. The conversion of 1-octene was 85.2% with the epoxide selectivity of 87.6% under optimal conditions. When a new equiv of H<sub>2</sub>O<sub>2</sub> was added at 21 h, the conversion of 1-octene increased from 85.2% to 90.9% after 24 h with almost constant selectivity. Further attempt of adding two equiv of H<sub>2</sub>O<sub>2</sub> was carried out. To our delight, a significant improvement in 1-octene conversion was observed, which achieved 95.6% conversion with epoxide selectivity of 87.9% after 24 h of reaction. However, when the equivalent of H<sub>2</sub>O<sub>2</sub> was increased to 3, a decrease to 92.7% in the conversion was observed compared with that of two equiv of H<sub>2</sub>O<sub>2</sub>, which indicates that an excess of H<sub>2</sub>O<sub>2</sub> is not effective to improve 1-octene conversion due to the difficulty of phase transfer in the catalytic system.

**Table S1** An attempt of adding new 30% H<sub>2</sub>O<sub>2</sub> to improve 1-octene conversion

Entry	Conditions		The results on 1-octene epoxidation	
	H <sub>2</sub> O <sub>2</sub> /1-octene molar ratio (equiv.) <sup>a</sup>	H <sub>2</sub> O <sub>2</sub> /1-octene molar ratio (equiv.) <sup>b</sup>	Conversion (%)	Selectivity (%)
1	5	0	85.2	87.6
2	5	1	90.9	87.8
3	5	2	95.6	87.9
4	5	3	92.7	85.9

Reaction condition:

Entry 1: 70 °C, 21h, 1-octene (6.50 mmol), farringtonite (105.00 mg), acetonitrile (5.60 g).

Entry 2,3 and 4: 70 °C, 24 h, 1-octene (6.50 mmol), farringtonite (105.00 mg), acetonitrile (5.60 g).

The conversion was determined by GC and based on 1-octene.

a: Initial amount of H<sub>2</sub>O<sub>2</sub>

b: Amount of added fresh H<sub>2</sub>O<sub>2</sub> at 21h