

Supporting Information

Tetramethylguanidine-based ionic liquid catalyzed synthesis of propylene glycol methyl ether

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This PDF file includes the following information:

1. GC traces for the reaction of PO with methanol

- a) GC trace for the mixture of PO and MeOH before the reaction
- b) GC trace for the mixture after reacting PO and MeOH catalyzed by [TMG][Ac]
- c) GC trace of the reaction mixture using [TMG][Ac] after being reused 9 times
- d) GC trace of the mixture after reaction of MeOH and styrene oxide
- e) GC trace of the reaction mixture of MeOH and 1, 2-epoxyhexane after reacting

2. The copies of ¹H of the TMG-based ILs and the isolated products

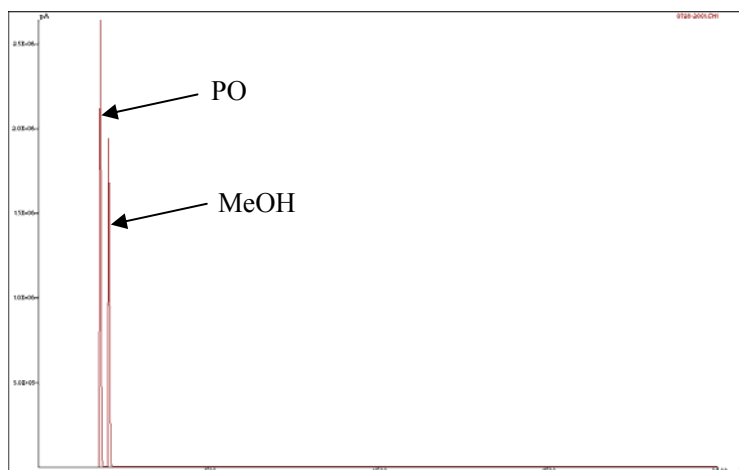
- a) [TMG][Tfa]
- b) [TMG][Lac]
- c) [TMG][Ac]
- d) The products (two isomers) of styrene oxide reacted with methanol
- e) The products (two isomers) of 1, 2-epoxyhexane reacted with methanol

3. Reaction of methanol with other epoxides

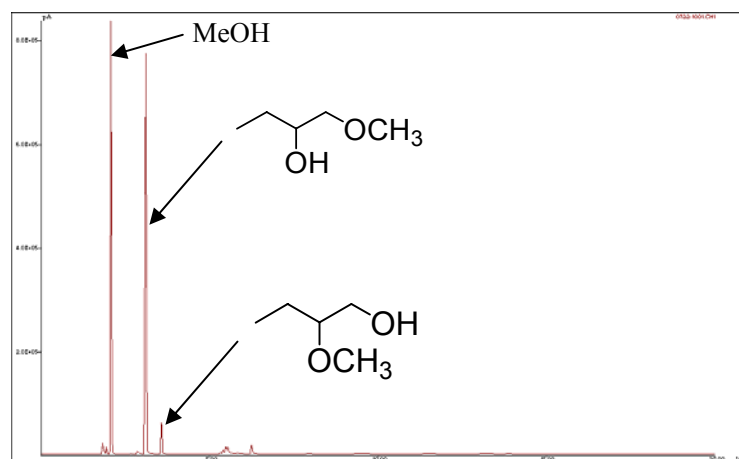
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1. GC traces for the reaction of PO with methanol

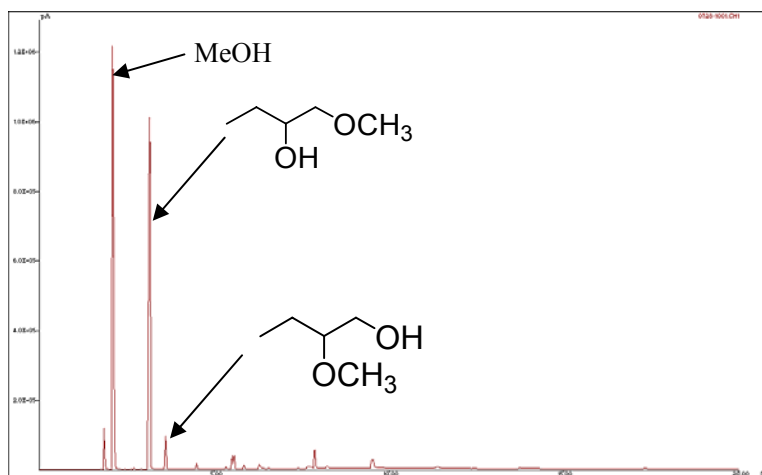
a) GC trace for the mixture of PO and MeOH before the reaction



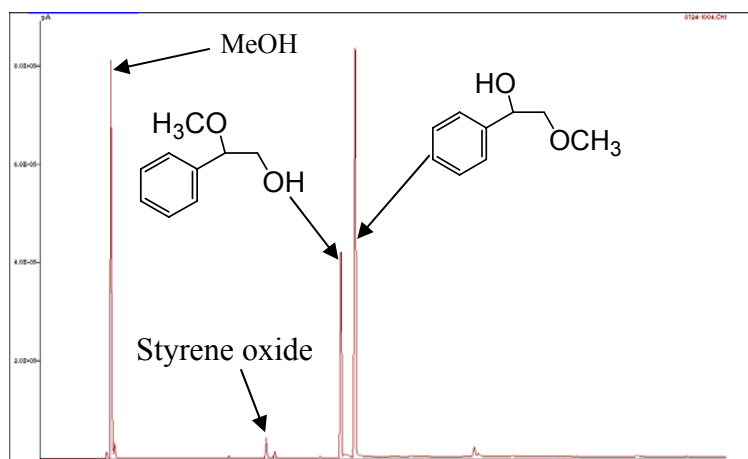
b) GC trace for the mixture after reacting PO and MeOH catalyzed by [TMG][Ac]



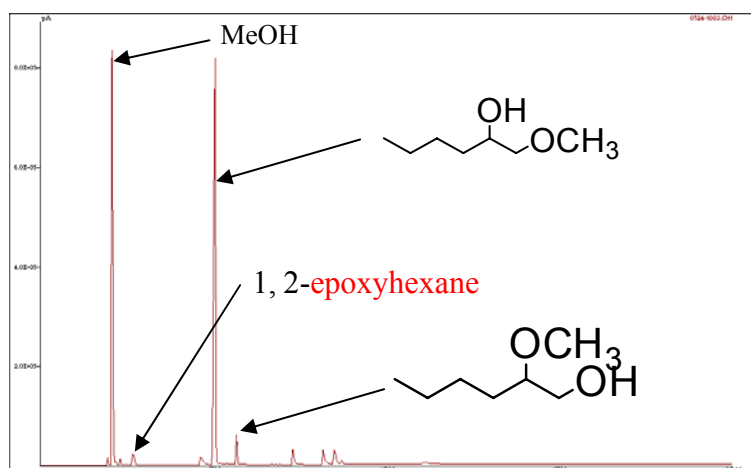
c) GC trace of the reaction mixture using [TMG][Ac] after being reused 9 times



d) GC trace of the mixture after reaction of MeOH and styrene oxide



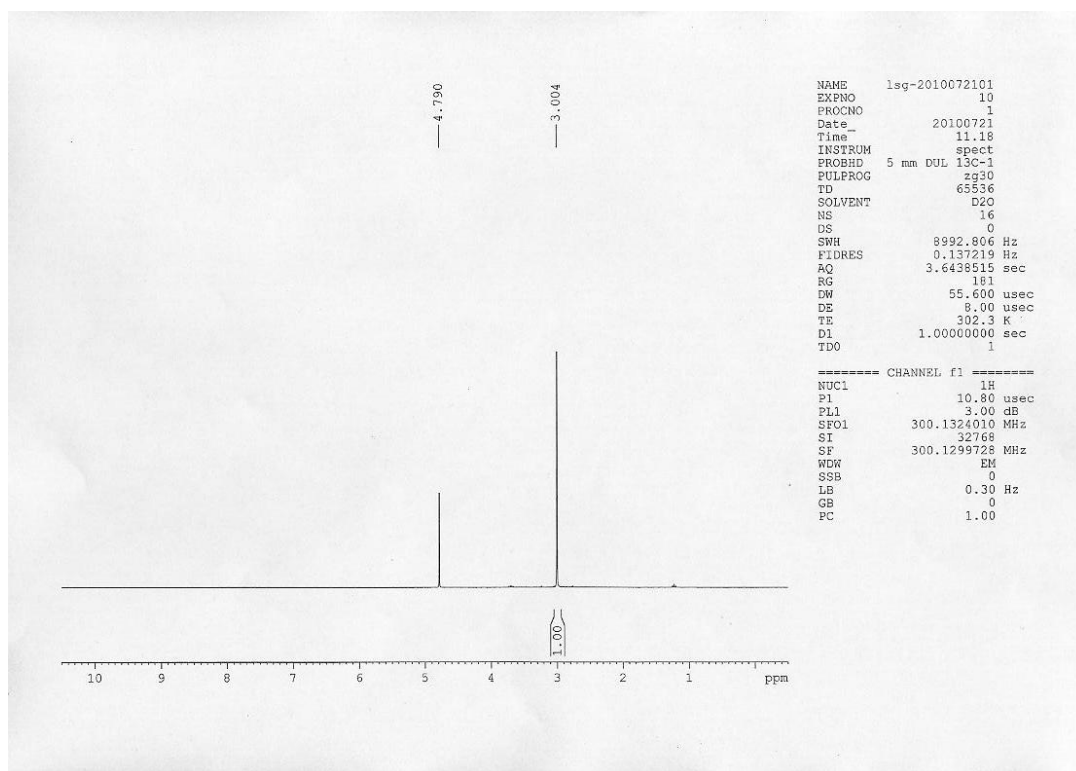
e) GC trace of the reaction mixture of MeOH and 1, 2-epoxyhexane after reacting



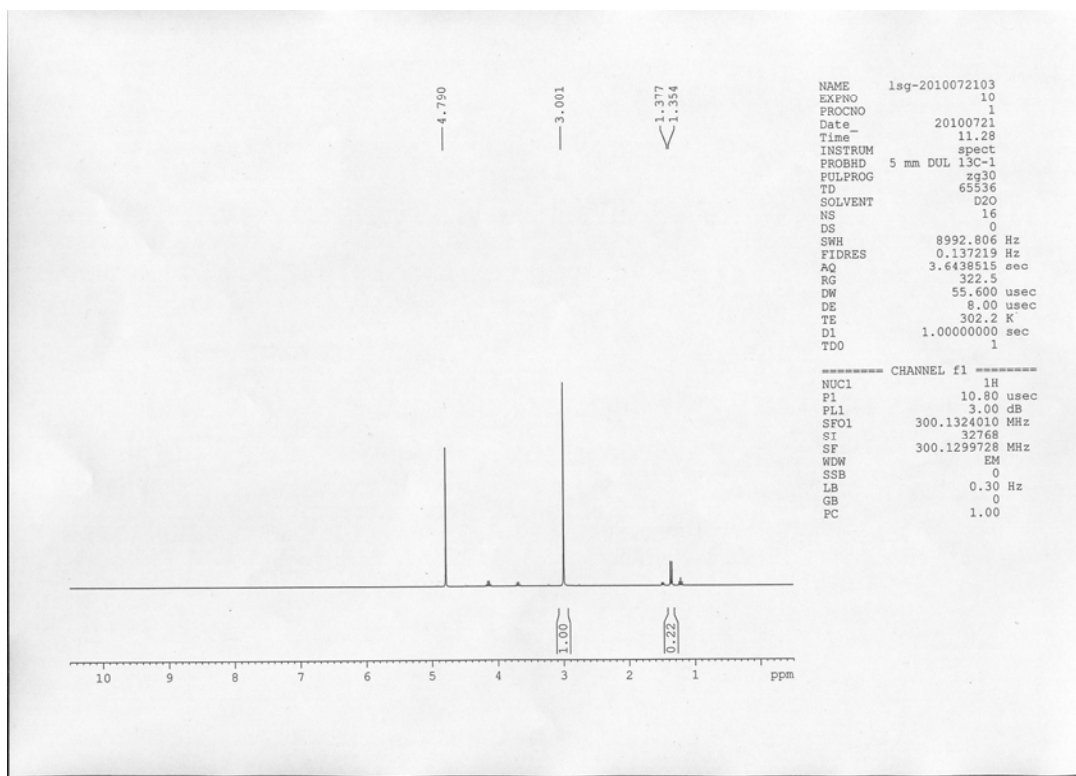
2. The copies of ¹H of the TMG-based ILs and the isolated products

After reaction, the IL and other impurities are wiped off by flash chromatography on silica gel (eluent: ethyl acetate) and the products is obtained by evaporated ethyl acetate under reduced pressure. ¹H NMR spectra of ILs were recorded D₂O as solutions in at room temperature on a Bruker spectrometer at 300 MHz. ¹H NMR spectra of products were recorded CDCl₃ as solutions in at room temperature on a Bruker spectrometer at 300 MHz.

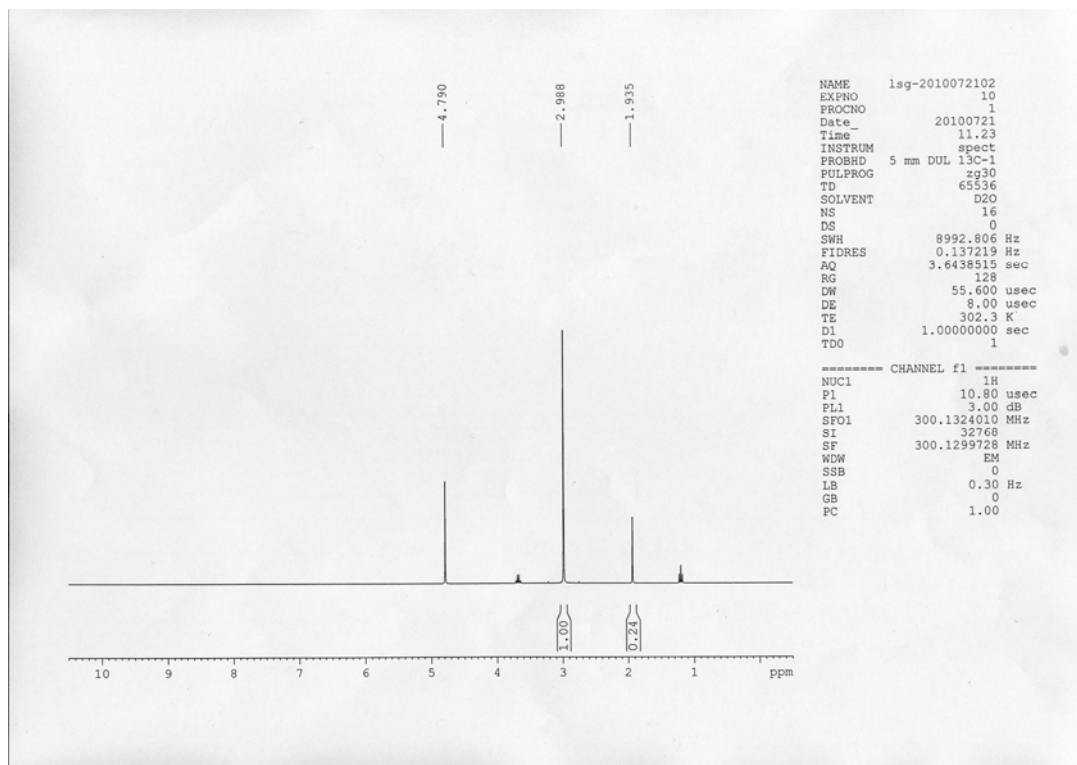
a) [TMG][Tfa]



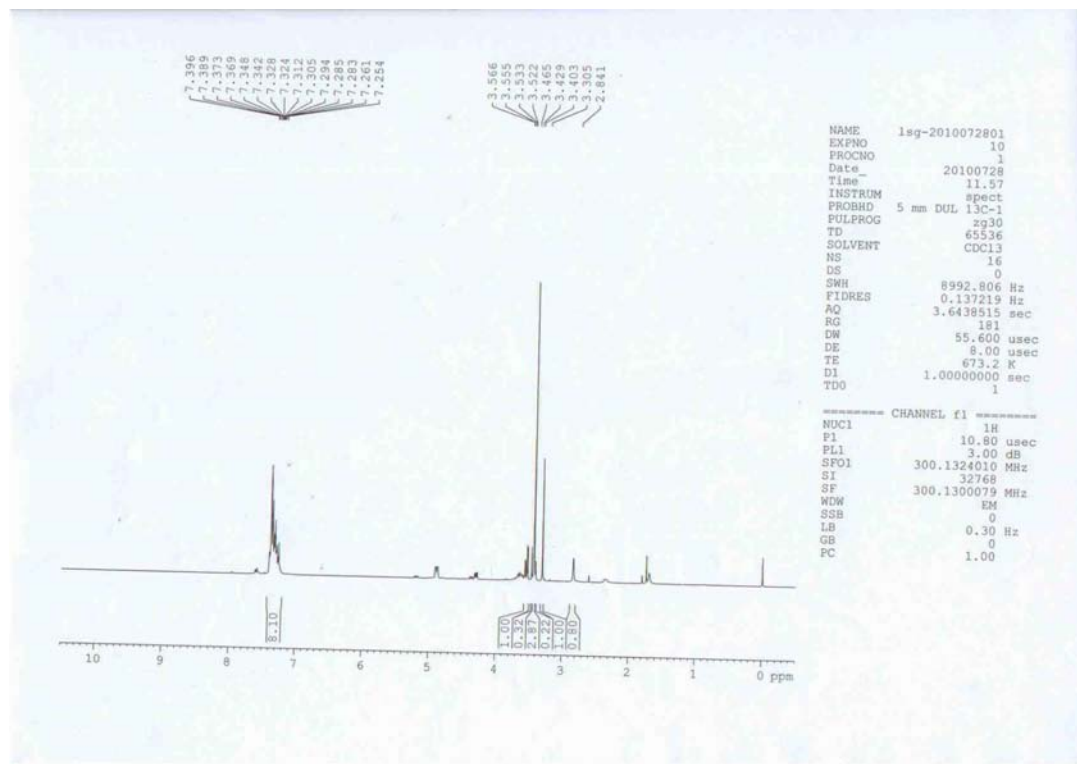
b) [TMG][Lac]



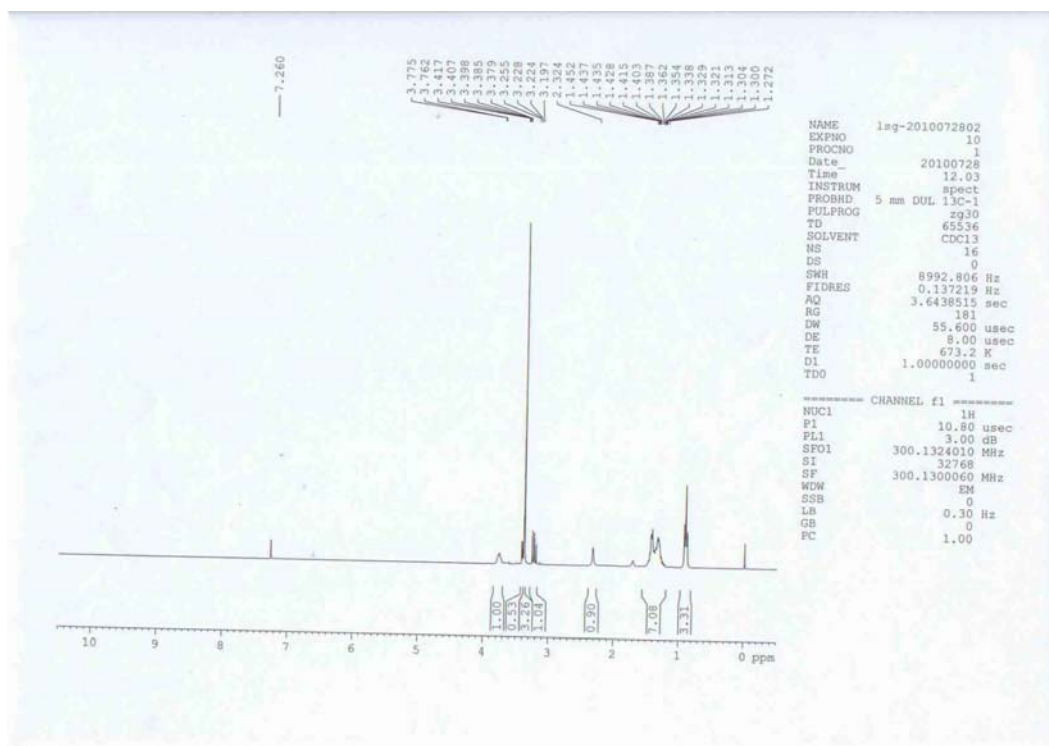
c) [TMG][Ac]



d) The products (two isomers) of styrene oxide reacted with methanol



e) The products (two isomers) of 1, 2-epoxyhexane reacted with methanol



3. Reaction of methanol with other epoxides

The reaction of other epoxides including styrene oxide and 1, 2-epoxyhexane with methanol was conducted using [TMG][Ac] as the catalyst. The results are shown in Table S1. The IL is also suitable for the reaction of MeOH and styrene oxide or 1, 2-epoxyhexane. But higher temperature and long time is necessary for completing the reaction.

Table S1 Results for the reaction of methanol with other epoxides

| Substrate | Temperature/K | Time/h | Isolated yields (%) ^a | GC selectivity/% |
|------------------|---------------|--------|----------------------------------|------------------|
| Styrene oxide | 343 | 12 | 86 | 69.3% |
| Styrene oxide | 363 | 4 | 92 | 71.0% |
| 1, 2-epoxyhexane | 343 | 12 | 79.5 | 97.0% |
| 1, 2-epoxyhexane | 363 | 4 | 82 | 96.9% |

^a Reaction conditions: Epoxide, 20 mmol; MeOH, 60 mmol; [TMG][Ac], 0.5 mmol.