Organic & Biomolecular Chemistry

Diastereoselective Synthesis of Vicinal *cis*-Dihydroxyheterospirocycles by One-pot Epoxidation/Spirocyclization of C(3)-Functionalized Cyclohex-2-en-1-ols

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Spirolactones, spirotetrahydrofurans, and spiropyrrolidines containing a vicinal *cis*-diol adjacent to the spiro-carbon center are prepared by one-pot epoxidation/spirocyclization of cyclohex-2-en-1-ols bearing an ester, alcohol, or amide functional side chain at the C(3) position of the ring.

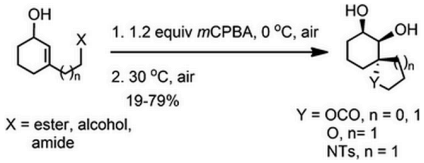

Table 1 One-pot epoxidation/cyclization of C(3)-functionalized cyclohex-2-en-1-ols

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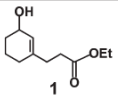
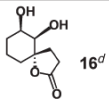
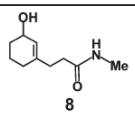
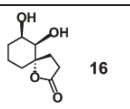
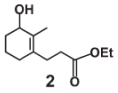
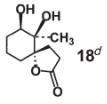
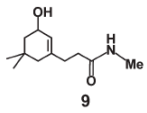
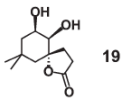
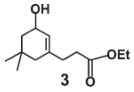
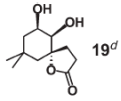
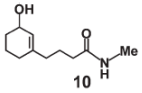
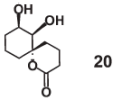
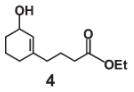
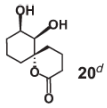
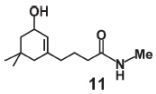
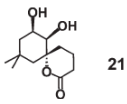
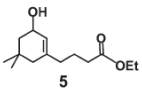
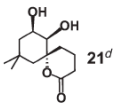
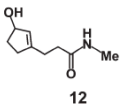
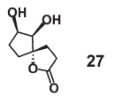
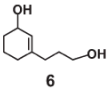
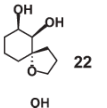
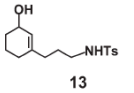
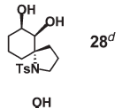
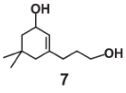
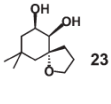
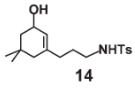
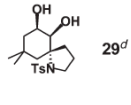
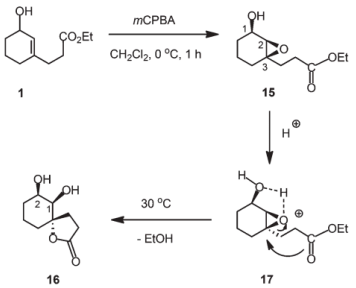
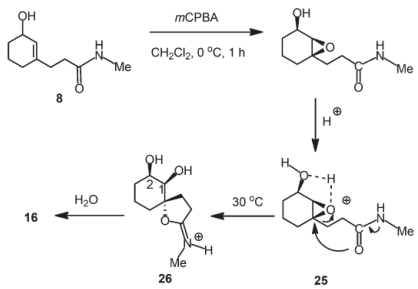
1	 1	3	 16[d]	43	8	 8	7	 16	64
2	 2	3	 18[d]	49	9	 9	10	 19	68
3	 3	18	 19[d]	65	10	 10	14	 20	58
4	 4	0.5[b]	 20[d]	48	11	 11	3[e]	 21	54
5	 5	0.5[b]	 21[d]	24	12	 12	9	 27	51
6	 6	2[c]	 22	29	13	 13	8	 28[d]	79
7	 7	2[c]	 23	19	14	 14	4[e]	 29[d]	51

[a] All reactions were first performed at 0 °C for 1 h and then warmed to higher temperature; isolated yield by column chromatography. [b] Cyclization was performed by treatment of the *syn* epoxycyclohexanol with KOH in refluxing MeOH/H_2O. [c] Both epoxidation and cyclization steps were performed in an ice bath. [d] Structures are confirmed by X-ray diffraction analysis. [e] The cyclization was performed in 1,2-dichloroethane at 84 °C.



Scheme 1 Plausible mechanism for the formation of compound **16** *via* epoxidation/spirocyclization of **1**.



Scheme 2 Plausible mechanism for the formation of compound **16** *via* epoxidation/spirocyclization of **8**.

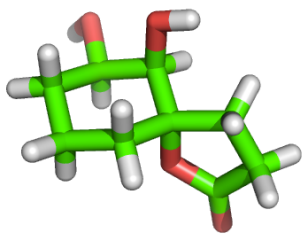


Fig. 1 X-ray crystallographic structure of **16**.