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2-TRIMETHYLSILYLETHYL GLYCOSIDES[a]. ANOMERIC DEBLOCKING OF MONO- AND DISACCHARIDES.

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Summary:
Anomeric deblocking of acetylated, benzylated and unprotected 2-trimethylsilylethyl (TMS-ethyl) glycosides was effected by treatment with trifluoroacetic acid/dichloromethane at 0-25°C for 10-30 min. The yield of deblocked and purified mono- and disaccharides varied between 90 and 95%.

We reported a stereoselective conversion of acetylated 2-trimethylsilylethyl (TMS-ethyl) glycosides into the corresponding 1,2-trans acetates as well as selective deblocking of the anomeric position[1] (the first synthesis and deblocking of TMS-ethyl glycosides was reported by Lipshutz et al.[2]).

In the present communication we report an optimised and high-yielding procedure for the deblocking of different protected TMS-ethyl glycosides (see Table 1). The exclusive formation of volatile reaction byproducts is of special value here; the desired free sugar is obtained practically pure by simple evaporation of the unwanted material. All products were however chromatographed for characterisation and determination of the yield.

After an extensive investigation it was found that trifluoroacetic acid in dichloromethane (ca. 2:1) at 0-25°C is a generally useful reagent for the deblocking of acetylated, benzylated and unprotected TMS-ethyl glycosides. No byproducts could be detected by t.l.c. and very high yields of products were routinely obtained (Table 1). 4,6-O-Benzylidene groups were cleaved simultaneously with the TMS-ethyl aglycon. Using 90% aqueous trifluoroacetic acid in dichloromethane[3] permitted however the selective hydrolysis of the 4,6-O-benzylidene group without affecting the TMS-ethyl group.

General procedure for the anomeric deblocking of TMS-ethyl glycosides:

The TMS-ethyl glycoside (**1-8**; 0.1 mmol) was dissolved under nitrogen in dichloromethane (0.5 mL), trifluoroacetic acid (1 mL) was added and the mixture was stirred (see Table 1). n-Propyl acetate (3 mL) and toluene (6 mL) were added and then removed at ca. 5 torr. A second portion of toluene (4 mL) was added and removed, which left the reducing saccharide sufficiently pure for most further applications. Column chromatography gave the pure compounds (**9-16**) in 90-95% yield (Table 1). Selected n.m.r. data for **1-16** are given in note 4.

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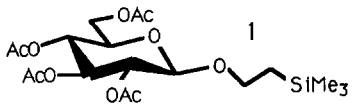
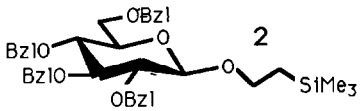
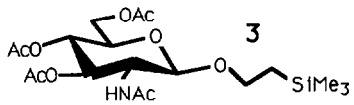
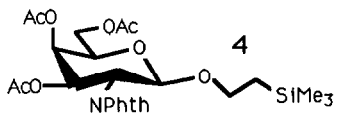
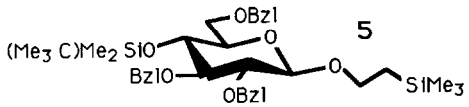
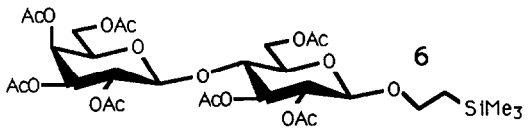
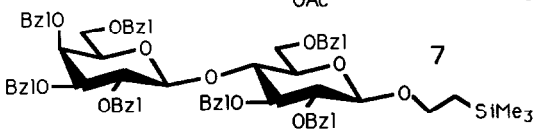
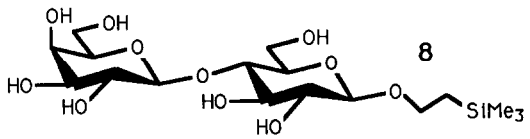
[a] 2. For part 1, see ref. 1

Table 1. Anomeric deblocking (Sugar-1-$OCH_2CH_2SiMe_3$ ⟶ Sugar-1-OH).

Glycoside	Reaction conditions[a]	Product and yield (%)[b]
 1	22°C; 20 min	9 (95)
 2	0°C; 30 min	10 (93)
 3	22°C; 10 min	11 (95)
 4	22°C; 20 min	12 (95)
 5	0°C; 30 min	13 (93)
 6	22°C; 20 min	14 (93)
 7	0°C; 30 min	15 (90)
 8	22°C; 30 min	16 (95)

a) see general procedure; b) chromatographed product.

References and notes

1 K. Jansson, T. Frejd, J. Kihlberg, and G. Magnusson, **Tetrahedron Lett., 1986,** 27, 753.

2 B. H. Lipshutz, J. J. Pegram, and M. C. Morey, **Tetrahedron Lett., 1981,** 22, 4603.

3 J. E. Christensen and L. Goodman, **Carbohydr. Res., 1968,** 7, 510.

4 N.m.r. data for **1-16** (anomeric signal only). ^1H ($CDCl_3$, Me_4Si) δ (ppm); **1**: 4.51 (J 7.8 Hz); **2**: 4.41 (J 7.8 Hz); **3**: 4.71 (J 8.3 Hz); **4**: 5.34 (J 8.6 Hz); **5**: 4.44 (virtual coupling similar to entry 19, Fig. 1 in ref. 5); **6**: 4.48, 4.47 (J 7.4 and 7.8 Hz); **7**: 4.45, 4.39 (J 8.1 and 7.3 Hz); **8** (D_2O): 4.49, 4.44 (J 8.1 and 7.8 Hz). ^{13}C ($CDCl_3$, Me_4Si) δ (ppm); **9**: 95.5, 90.0; **10**: 97.5, 91.3; **11**: 97.4, 91.4; **12**: 93.1, 92.7; **13**: 97.5, 90.8; **14**: 101.05, 100.96, 95.1, 90.0; **15**: 102.82, 102.77, 97.3, 91.3; **16** (D_2O): 105.64, 105.59, 98.5, 94.5 (identical with authentic lactose).

5 J. Dahmen, T. Frejd, G. Grönberg, G. Magnusson, and G. Noori, **Carbohydr. Res. 1984,** 125, 161.

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