Note

Methyl 4,6-*O*-benzylidene-α- and -β-D-glucosides

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A recent publication[1] on synthesis of methyl 4,6-*O*-benzylidene-α-D-glucoside (**1**) prompts a description of the preparation of **1** and of its β anomer (**2**) in better yields (namely, 80% of **1** and 60% of **2**) than the 50% yield reported[1] for **1**.

Methyl α- or β-D-glucopyranoside is treated with one molecular proportion of α,α-dimethoxytoluene (benzaldehyde dimethyl acetal) in *N*,*N*-dimethylformamide containing a trace of acid, with removal of the resulting methanol by evaporation under diminished pressure[2]. α,α-Dimethoxytoluene is readily prepared in high yield, and is stable when stored in a tightly stoppered vessel. As the reagents are cheap, the syntheses have been conducted with a view to speed and simplicity, rather than to the highest yield possible.

EXPERIMENTAL

Methyl α-D-glucopyranoside was dried for 12 h at 100°, and the β anomer for 12 h *in vacuo* over potassium hydroxide, before use. *N*,*N*-Dimethylformamide (DMF) was dried by stirring it with a small proportion of phosphorus pentaoxide, and was filtered through a sintered-glass disc onto the other reagents. Gas–liquid chromatography (g.l.c.) was performed with a custom-made instrument by using nitrogen as the carrier gas and a hydrogen-flame ionization detector, with the column packings and temperatures as indicated. The evaporator was evacuated by a filter pump (water aspirator).

α,α-Dimethoxytoluene. — A solution of benzaldehyde (21.2 g) and trimethyl orthoformate (24.0 g) in methanol (100 ml) containing Amberlite IR-120 (H^+) ion-exchange resin (1 g, 20–50 mesh, washed with methanol) was boiled for 3 h under reflux. The resin was filtered off, and the filtrate was evaporated at <35° on a rotary evaporator. The product was distilled at 104–108°/40 torr, to give α,α-dimethoxytoluene (26.5 g, 88%) which showed no C=O stretching in its i.r. spectrum, and appeared to be free from benzaldehyde on examination by g.l.c. (1.5% QF1 on Chromosorb W, at 65°).

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Methyl 4,6-O-benzylidene-α-D-glucoside (**1**). — Methyl α-D-glucopyranoside (9.7 g), α,α-dimethoxytoluene (7.6 g), DMF (40 ml), and *p*-toluenesulfonic acid monohydrate (0.025 g) were placed in a 250-ml, round-bottomed flask; this was then attached to a Buchi evaporator, rotated, evacuated, and lowered into a water bath at 60 ±5°, so that DMF refluxed in the vapor duct. After 1 h, a short-path, evaporation adaptor (see Fig. 1) was fitted between the flask and the vapor duct, and

Fig. 1. Shorth-path, evaporation adaptor.

the DMF was evaporated, the temperature of the water bath being raised to 100°. When no more DMF distilled over, the flask was cooled, and removed from the evaporator. A solution of sodium hydrogen carbonate (1 g) in water (50 ml) was added to the residue, and the mixture was heated at 100° until the product was finely dispersed. The mixture was cooled to 20°, and the product was filtered off, washed thoroughly with water, and dried for 4 h at 30° and then overnight *in vacuo* over phosphorus pentaoxide and paraffin wax, to give **1** (11.6 g, 82.4%); m.p. 166–167°. A sample was acetylated and the peracetate examined by g.l.c. (1.5% LAC-IR-296 on Chromosorb W, at 245°); it showed a peak (3.5% of the total peak areas) having a retention time very similar to that of the main product, as the only impurity; acetylated **2** was not detected. Recrystallization from propyl alcohol (28 ml) and pyridine (0.5 ml) gave **1** (8.95 g, 63.5%), m.p. 167.5–168.5°, $[\alpha]_D$ +105° (*c* 1.1, chloroform); lit.[1] m.p. 166–167°, $[\alpha]_D$ +110° (chloroform).

Methyl 4,6-O-benzylidene-β-D-glucoside (**2**). — Methyl β-D-glucopyranoside (9.7 g) was benzylidenated as described for **1**. After removal of the solvents, the cake of product was broken up with a spatula, and dissolved in a solution of sodium

hydrogen carbonate (1 g) in water (150 ml) and ethylalc ohol (50 ml) by heating on a boiling-water bath. Thesolution was cooled to 4°, and **2** was filtered off, washed well with water, and dried for 30 h at 30°. The product (8.2 g, 58%) had m.p. 207–208.5° (unchanged by recrystallization from ethyl alcohol) and $[\alpha]_D$ −76° (*c* 1.0, methanol); lit. values vary[3] from m.p. 194° to m.p. 205°, $[\alpha]_D$ −75° (methanol). A sample was acetylated, and the peracetate was examined by g.l.c. (column and temperature, as for the α anomer); it showed as the only impurity a small peak (4% of the total peak areas) having a retention time identical with that of acetylated **1**.

REFERENCES

1 J. W. Van Cleve, *Carbohyd. Res.*, 17 (1971) 461.
2 F. H. Bissett, M. E. Evans, and F. W. Parrish, *Carbohyd. Res.*, 5 (1967) 184.
3 A. N. de Belder, *Advan. Carbohyd. Chem.*, 20 (1965) 219, and references cited therein.