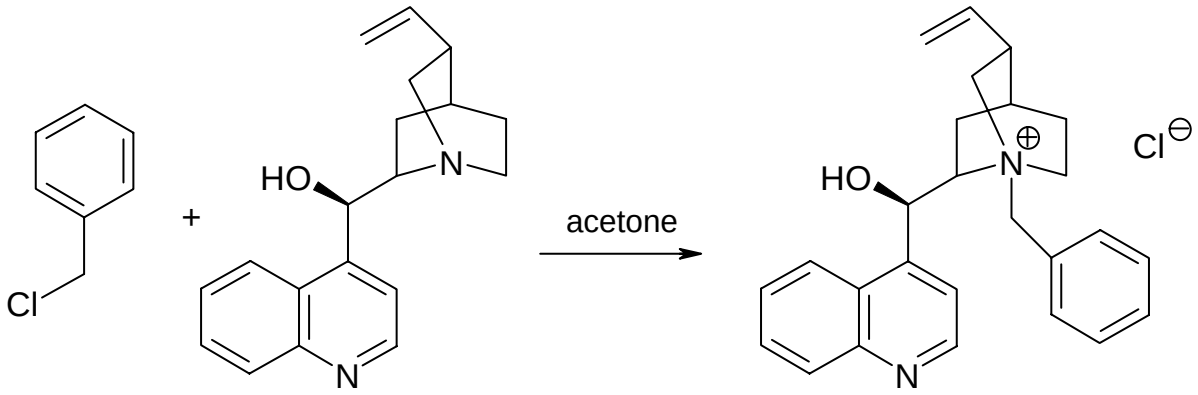
4012 Synthesis of (-)-N-benzylcinchonidinium chloride



C_7H_7Cl (126.6) $C_{19}H_{22}N_2O$ (294.4) $C_{26}H_{29}N_2OCl$ (421.0)

Classification

Reaction types and substance classes
nukleophilic substitution
chloroalkane, amine, natural product

Work methods
heating under reflux, stirring with magnetic stir bar, filtering, heating with oil bath

Instruction (batch scale 10 mmol)

Equipment
100 mL round bottom flask, reflux condenser, drying tube, heatable magnetic stirrer, magnetic stir bar, suction flask, Buechner funnel (Ø = 5.5 cm), electronic temperature control, oil bath

Substances

cinchonidine (mp 199-202 °C)	2.94 g (10.0 mmol)
benzyl chloride (bp 49 °C/ 4 hPa)	1.90 g (1.57 mL, 15.0 mmol)
acetone absolut (bp 56 °C)	70 mL
acetone (bp 56 °C)	40 mL

Reaction
2.94 g (10.0 mmol) cinchonidine and 1.90 g (1.57 mL, 15.0 mmol) benzyl chloride are placed in a 100 mL round bottom flask with magnetic stir bar and reflux condenser with drying tube and heated under reflux in 70 mL absolute acetone for 2 days.

Work up
The yellowish solution is cooled to room temperature. The precipitated product is sucked off with a Buechner funnel (Ø = 5.5 cm), twice washed on the filter with 20 mL acetone each and then dried.
Yield: 3.15 g (7.48 mmol, 75%); $[\alpha]_D^{20}$ = -175.1 ° (H_2O, c = 0.4)

Comments
In experiment Number 4014 this product is used as educt.

Waste management

Waste disposal

Waste	Disposal
mother liquor	organic solvents, containing halogen

Time
2-3 hours
Additional 2 days of heating under reflux

Break
After the heating under reflux

Degree of difficulty
Easy

Instruction (batch scale 100 mmol)

Equipment
1 L round bottom flask, reflux condenser, drying tube, heatable magnetic stirrer, magnetic stir bar, suction flask, Buechner funnel (Ø = 10 cm), electronic temperature control, oil bath

Substances

cinchonidine (mp 199-202 °C)	29.4 g (100 mmol)
benzyl chloride (bp 49 °C/ 4hPa)	19.0 g (15.7 mL, l50 mmol)
acetone absolut (bp 56 °C)	400 mL
acetone (bp 56 °C)	310 mL

Reaction
29.4 g (100 mmol) cinchonidine and 19.0 g (15.7 mL, 150 mmol) benzyl chloride are placed in a 1 L round bottom flask with magnetic stir bar and reflux condenser with drying tube and heated under reflux in 400 mL absolute acetone for 3 days.

Work up
The yellowish solution is cooled to room temperature. The precipitated product is sucked off with a Buechner funnel (Ø = 10 cm). Afterwards it is stirred with 150 mL acetone for one

hour at room temperature and sucked off again. It is washed again twice with 80 mL acetone each and then dried.

Yield: 31.1 g (73.8 mmol, 74%); $[\alpha]_D^{20}$ = -174 ° (H_2O, c = 0.4)

Comments

In experiment Number 4014 this product is used as educt.

Waste management

Waste disposal

Waste	Disposal
mother liquor	organic solvents, containing halogen

Time

3-4 hours

Additional 3 days of heating under reflux

Break

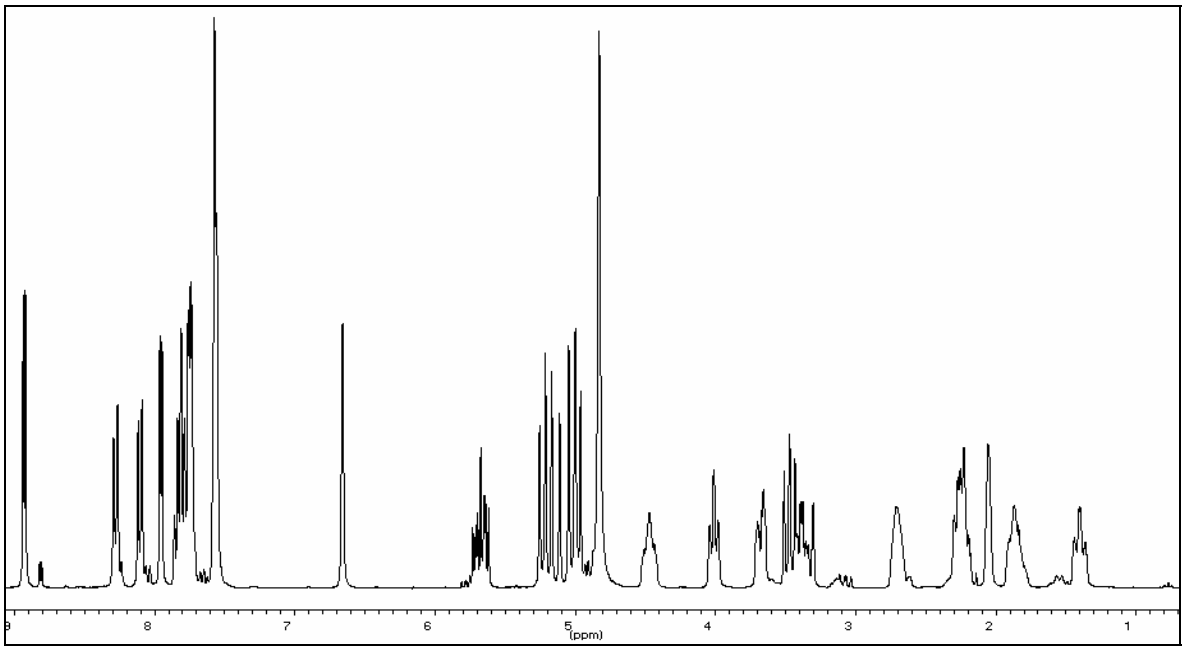
After heating under reflux

Degree of difficulty

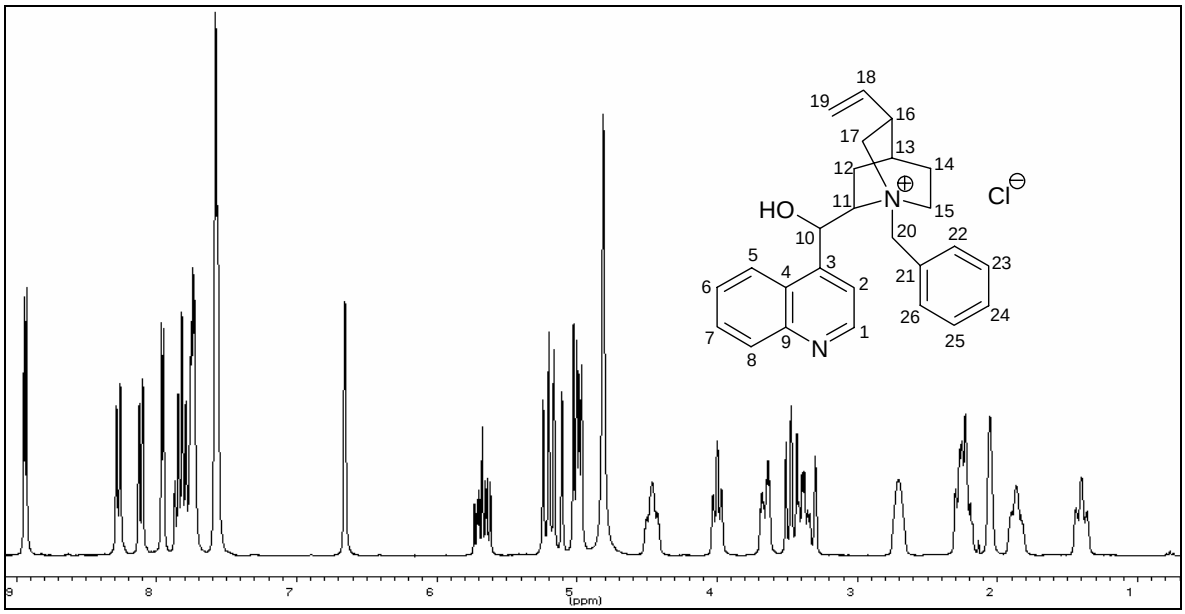
Easy

Analytics

^{1}H NMR spectrum of the crude product (300 MHz, MeOD)

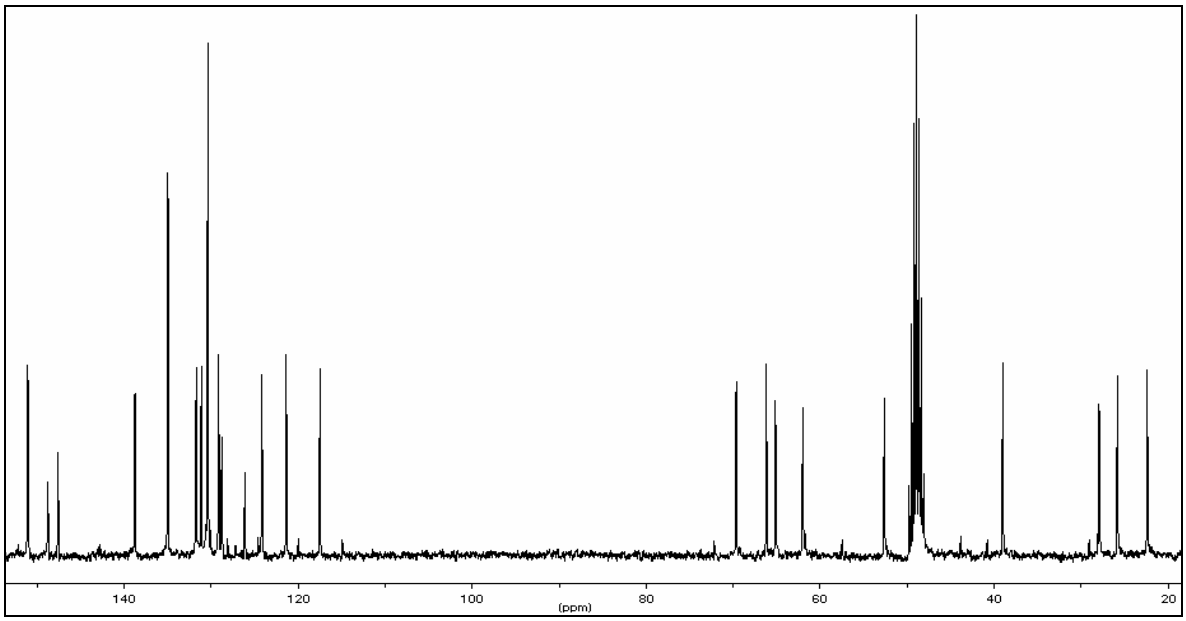


^{1}H NMR spectrum of the pure product (300 MHz, MeOD)

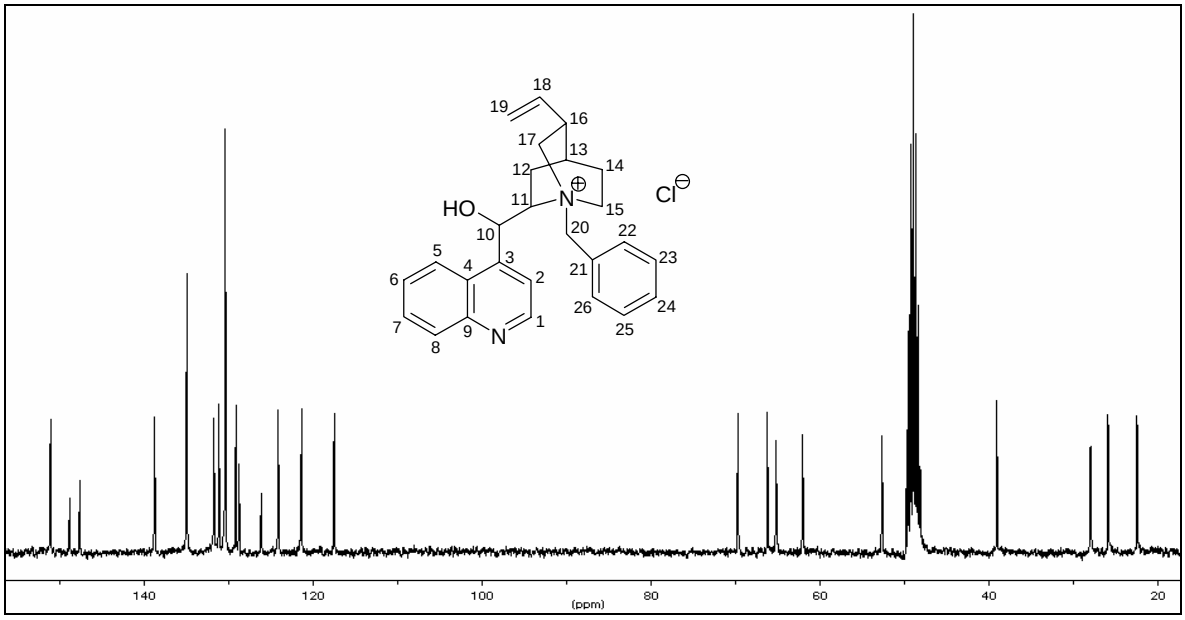


δ (ppm)	Multiplicity	Number of H	Assignment
1.42	M	1	12-H
1.89	M	1	13-H
2.07	M	1	12-H
2.26	M	2	14-H
2.75	M	1	16-H
3.40	M	1	15-H
3.49	M	1	17-H
3.69	M	1	17-H
4.04	M	1	11-H
4.49	M	1	15-H
4.83	S	1	-OH
5.0	M	1	19-H
5.04	D	1	20-H
5.15	M	1	19-H
5.24	D	1	20-H
5.70	M	1	18-H
6.68	M	1	10-H
7.59	M	3	23-H, 24-H, 25-H
7.76	M	3	6-H, 22-H, 26-H
7.84	M	1	7-H
7.97	D	1	2-H
8.12	M	1	8-H
8.29	M	1	5-H
8.95	D	1	1-H

^{13}C NMR spectrum of the crude product (75.5 MHz, MEOD)

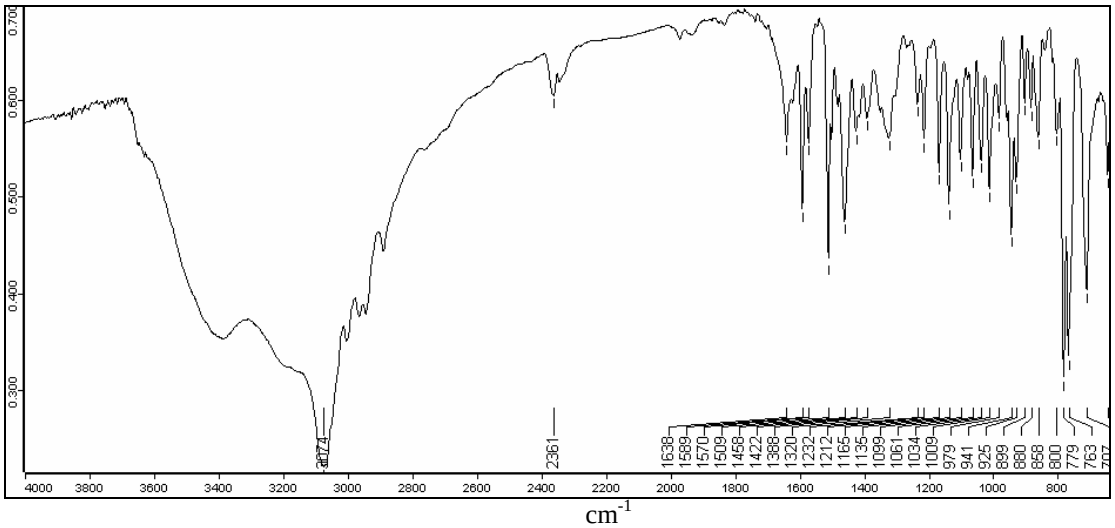


^{13}C NMR spectrum of the pure product (75.5 MHz, MeOD)



δ = 151.0, 148.7, 147.6, 138.7, 134.9, 131.7, 131.1, 130.3, 129.1, 128.8, 126.1, 124.2, 121.4, 117.5, 69.7, 66.2, 65.2 (C20), 62.0, 52.7, 39.1, 28.0, 25.9, 22.5, 47-50 (solvent)

IR spektrum of the pure product (KBr)



(cm^{-1})	**Assignment**
3600-2800	O-H-valence, H-bridges, superimposed by C-H-valence
3075	C-H-valence, arene
1640	C=C-valence, alkene
1590, 1570, 1510	C=C-valence, arene