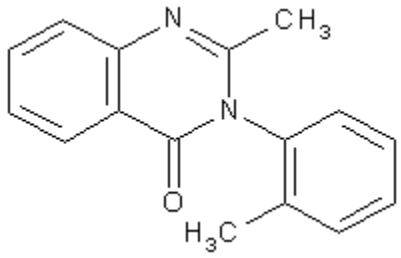
METHAQUALONE

Latest Revision: February 15, 1999



1. SYNONYMS

CFR: Methaqualone

CAS #: Base: 72-44-6
Hydrochloride: 340-56-7

Other Names: 2-Methyl-3-(2-methylphenyl)-4-(3*H*)-quinazolinone
2-Methyl-3-*o*-tolyl-4-(3*H*)-quinazolinone
Dormogen
Metolquizolone
Mandrax
MAOA
Motolon
Quaalude
Sopor

2. CHEMICAL AND PHYSICAL DATA

2.1. CHEMICAL DATA

Form	Chemical Formula	Molecular Weight	Melting Point (°C)
Base	$C_{16}H_{14}N_2O$	250.3	114-116
Hydrochloride	$C_{16}H_{15}N_2OCl$	286.8	255-265

2.2. SOLUBILITY

Form	A	C	E	H	M	W
Base	***	S	P	***	PS	I
Hydrochloride	S	S	I	***	S	PS

A = acetone, C = chloroform, E = ether, H = hexane, M = methanol and W = water, VS = very soluble, FS = freely soluble, S = soluble, PS = sparingly soluble, SS = slightly soluble, VSS = very slightly soluble and I = insoluble

3. SCREENING TECHNIQUES

3.1. COLOR TESTS

REAGENT	COLOR PRODUCED
Acidified cobalt thiocyanate	Blue
Fischer-Morris	Pink

3.2. CRYSTAL TESTS

REAGENT	CRYSTALS FORMED
Potassium permanganate solution	Plates
Sodium carbonate solution	Needles

3.3. THIN-LAYER CHROMATOGRAPHY

Visualization

Acidified iodoplatinate solution	Brown-violet
Dragendorff spray	Yellow-orange

COMPOUND	RELATIVE R_1		
	System TLC6	**System TLC5**	**System TLC7**
mecloqualone	0.8	1.0	1.0
methaqualone	1.0	1.0	1.0
o-toluidine	1.3	1.6	1.6

3.4. GAS CHROMATOGRAPHY

Methaqualone is a thermally stable compound well suited for gas chromatography. It may however, have a similar retention time with cocaine in certain temperature programs.

Method MEQ-GCS1

Instrument: Gas chromatograph operated in split mode with FID

Column: 5% phenyl/95% methyl silicone 12 m x 0.2 mm x 0.33 µm film thickness

Carrier gas: Helium at 1.0 mL/min

Temperatures: Injector: 270°C
Detector: 280°C
Oven program:
1) 175°C initial temperature for 1.0 min
2) Ramp to 275°C at 15°C/min
3) Hold final temperature for 3.0 min

Injection Parameters: Split Ratio = 60:1, 1 µL injected

Samples are to be dissolved in chloroform and filtered.

COMPOUND	RRT	COMPOUND	RRT
benzoic acid	0.13	chlorpheniramine	0.82
nicotinamide	0.21	procaine	0.84
methylecgonidine	0.22	**methaqualone**	**1.00 (5.05 min)**
methylecgonine	0.28	norcocaine	1.01

benzocaine	0.34	cocaine	1.05
ibuprofen	0.36	tetracaine	1.07
acetaminophen	0.43	tetracosane	1.20
phenacetin	0.46	codeine	1.25
amobarbital	0.47	*c*-cinnamoylcocaine	1.26
pentobarbital	0.51	Morphine	1.30
secobarbital	0.56	acetylcodeine	1.38
caffeine	0.61	*t*-cinnamoylcocaine	1.39
diphenhydramine	0.65	O^6-monoacetylmorphine	1.40
antipyrine	0.67	benzoylecgonine	1.48
lidocaine	0.67	heroin	1.52
aminopyrine	0.73	trimethoxycocaine	1.66
tropacocaine	0.77	quinidine	1.69
phenobarbital	0.76	quinine	1.71
theophylline	0.80		

3.5. HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

Method MEQ-LCS1

Instrument: High performance liquid chromatograph equipped with diode array

Column: 5 µm ODS, 150 mm x 4.6 mm

Detector: UV, 210 nm

Flow: 1.0 mL/min

Injection Volume: 5.0 µL

Buffer: 4000 mL distilled water, 10 g sodium hydroxide, 30.0 mL phosphoric acid and 8.0 mL hexylamine

Mobile Phase: 1) Initially, buffer: acetonitrile 98:2 for 2 min
2) Gradient to buffer: acetonitrile 80:20 over 12 min

3) Gradient to buffer: acetonitrile 60:40 over 13 min
4) Hold buffer: acetonitrile 60:40 for 5 min

Samples are to be dissolved in buffer: acetonitrile 90: 10, sonicated, then filtered with a 0.45- micron filter.

COMPOUND	RRT	COMPOUND	RRT
isonicotinamide	0.07	tropacocaine	0.46
nicotinamide	0.08	benzoyl ecgonine	0.47
morphine	0.12	antipyrine	0.49
phenylpropanolamine	0.13	cocaine	0.50
ephedrine	0.15	acetylcodeine	0.51
aminopyrine	0.16	heroin	0.54
procaine	0.18	phencyclidine	0.64
amphetamine	0.19	aspirin	0.70
methamphetamine	0.22	diazepam	0.73
codeine	0.23	*t*-cinnamoylcocaine	0.74
methylenedioxy-amphetamine	0.25	phenobarbital	0.76
methylenedioxy-methamphetamine	0.27	tetracaine	0.77
lidocaine	0.28	phenacetin	0.78
quinine	0.29	diphenhydramine	0.79
O^6-monoacetylmorphine	0.32	phenyl-2-propanone	0.80
acetaminophen	0.33	benzocaine	0.83
strychnine	0.40	amobarbital	0.98
caffeine	0.42	**methaqualone**	**1.00 (23.58 min)**
barbital	0.44	secobarbital	1.07

4. SEPARATION TECHNIQUES

Generally, this compound is found in tablet form. The tableting material usually is chloroform insoluble and the sample can be washed with solvent to yield methaqualone.

Interference from precursor material, intermediates, and by-products may require a simple liquid-liquid extraction. Suspend the sample in 1 M sodium bicarbonate solution, and then extract the free base quantitatively with several portions of chloroform. The organic layers are combined, filtered, and dried over anhydrous sodium sulfate.

5. QUANTITATIVE PROCEDURES

5.1. GAS CHROMATOGRAPHY

Methaqualone base is a stable compound that does not breakdown in the injection port. The hydrochloride salt of methaqualone does affect the chromatography and disassociates in the injector port. Therefore, a response error would be obtained when using a different salt form for standard and sample.

Method MEQ-GCQ1

Internal Standard Stock Solution:
0.6 mg/mL tetracosane in chloroform.

Standard Solution Preparation:
Accurately weigh and prepare a standard solution of methaqualone base at approximately 0.5 mg/mL using above internal standard stock solution.

Sample Preparation:
Accurately weigh an amount of sample into a volumetric flask and dilute with internal standard stock solution. If necessary, dilute the sample so the final concentration approximates the standard concentration.

Instrument:	Gas chromatograph operated in split mode with FID
Column:	5% phenyl/95% methyl silicone 12 m x 0.2 mm x 0.33 µm film thickness
Carrier gas:	Helium 1.1 mL/min
Temperatures:	Injector: 270°C Detector: 280°C Oven program: 230°C isothermal
Injection Parameters:	Split Ratio = 60:1, 1 µL injected
Typical Retention Time:	Methaqualone: 2.13 min Tetracosane: 3.29 min
Linear Range:	0.1-1.0 mg/mL
Repeatability:	RSD less than 1.0%
Correlation Coefficient:	0.999

Accuracy: Error less than 5%

COMPOUND	RRT	COMPOUND	RRT
dimethylsulfone	0.19	diphenhydramine	0.49
nicotinamide	0.23	lidocaine	0.51
amphetamine	0.24	phenobarbital	0.60
ephedrine	0.24	procaine	0.70
benzocaine	0.27	**methaqualone**	**1.00 (2.13 min)**
methamphetamine	0.28	cocaine	1.10
ibuprofen	0.29	tetracaine	1.15
acetaminophen	0.33	tetracosane	1.54
phenacetin	0.34	codeine	1.79
amobarbital	0.35	morphine	2.03
pentobarbital	0.37	heroin	>2.5
secobarbital	0.40	quinine	>2.5
caffeine	0.46		

5.2. HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

Method MEQ-LCQ1

Internal Standard Stock Solution:
0.1 mg/mL strychnine in buffer: acetonitrile 50:50.

Standard Solution Preparation:
Accurately weigh and prepare a standard solution of methaqualone hydrochloride at approximately 0.5 mg/mL using internal standard stock solution.

Sample Preparation:
Accurately weigh an amount of sample into a volumetric flask and dilute with internal standard stock solution. If necessary, dilute the sample so the final concentration approximates the standard concentration. Filter sample with 0.45-micron filter.

Instrument: High performance liquid chromatograph equipped with diode array

Column:	5 µm ODS, 150 mm x 4.6 mm
Detector:	UV, 210 nm
Flow:	1.5 mL/min
Injection Volume:	5.0 µL
Buffer:	4000 mL distilled water, 10 g sodium hydroxide, 30.0 mL phosphoric acid and 8.0 mL hexylamine
Mobile Phase:	Buffer: acetonitrile 65:35
Typical Retention Time:	Methaqualone: 4.25 min Strychnine: 1.06 min
Linear Range:	0.1 - 1.0 mg/mL
Repeatability:	RSD less than 0.5%
Correlation Coefficient:	0.999
Accuracy:	Error less than 3.5%

COMPOUND	RRT	COMPOUND	RRT
strychnine	0.25	**methaqualone**	**1.00 (4.25 min)**
methadone	0.66	mecloqualone	1.23

6. QUALITATIVE DATA

See spectra on the following pages for FT-IR, Mass Spectrometry, Nuclear Magnetic Resonance, and Vapor Phase IR.

7. REFERENCES

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Angelos S. A. and Meyers J. A., "The Isolation and Identification of Precursors and Reaction Products in the Clandestine Manufacture of Methaqualone and Mecloqualone," *Journal of Forensic Sciences*, Vol. 30, No.4,

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Dal Cason T. A., Angelos S. A. and Washington O., "Identification of Some Chemical Analogues and Positional Isomers of Methaqualone," *Journal of Forensic Sciences*, Vol. 26, No.4, Oct. 1981, pp. 1793-833.

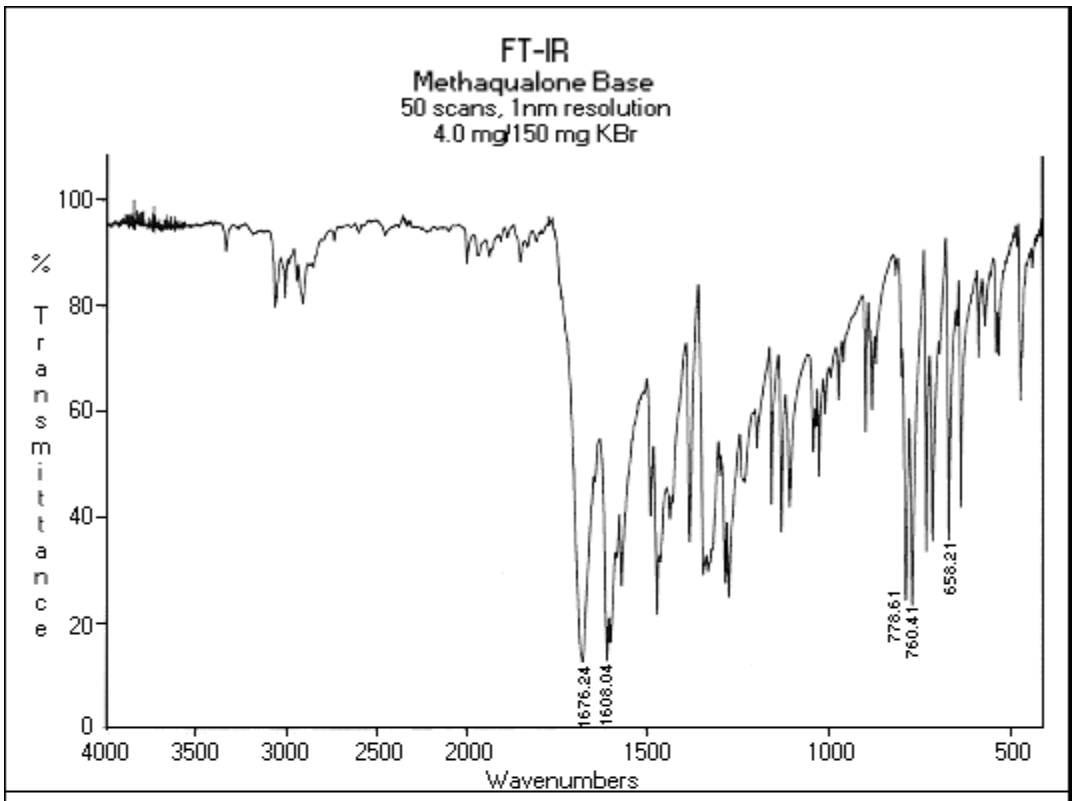
Clarke, E.G.C., *Isolation and Identification of Drugs, 2nd Edition*, The Pharmaceutical Press, 1986.

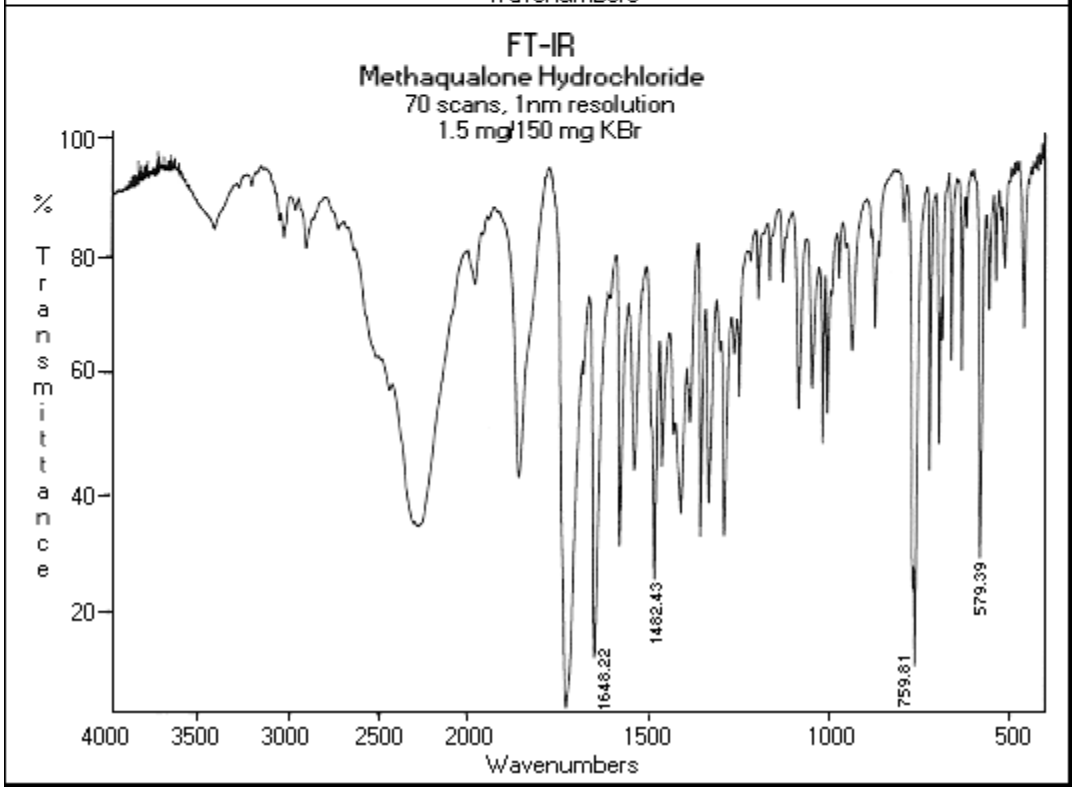
Budavari, S., *The Merck Index, 11th Edition*, Merck and Co., Inc., 1996, p. 936.

8. ADDITIONAL RESOURCES

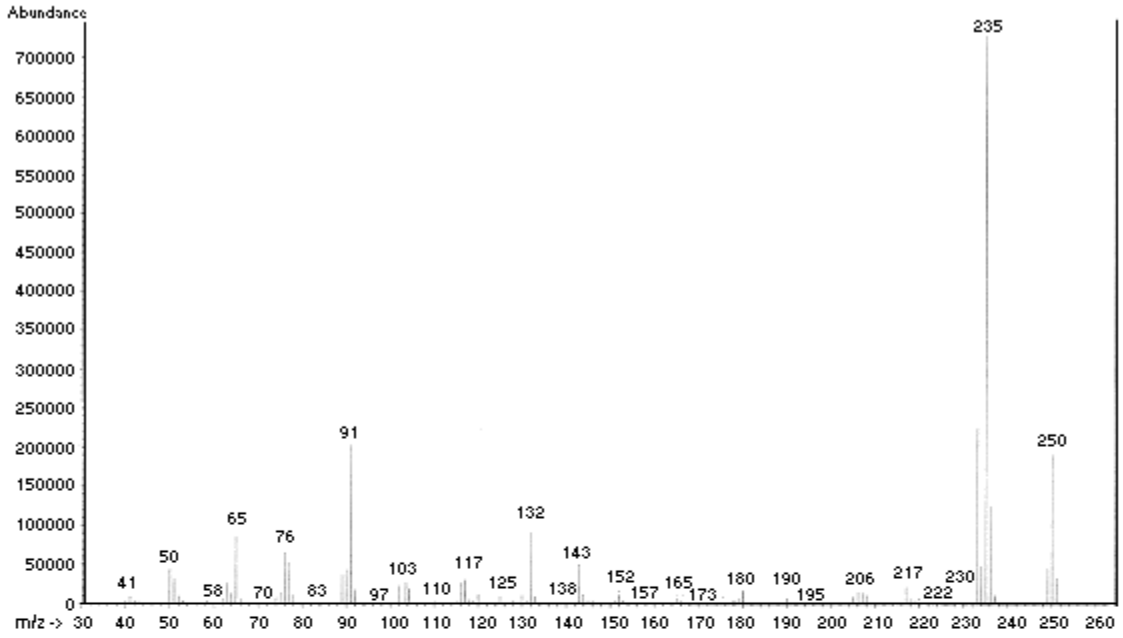
Forendex

Wikipedia


FT-IR
Methaqualone Base
50 scans, 1nm resolution
4.0 mg/150 mg KBr
% Transmittance
100
80
60
40
20
0
4000
3500
3000
2500
2000
1500
1000
500
Wavenumbers
1676.24
1608.04
778.61
760.41
658.21

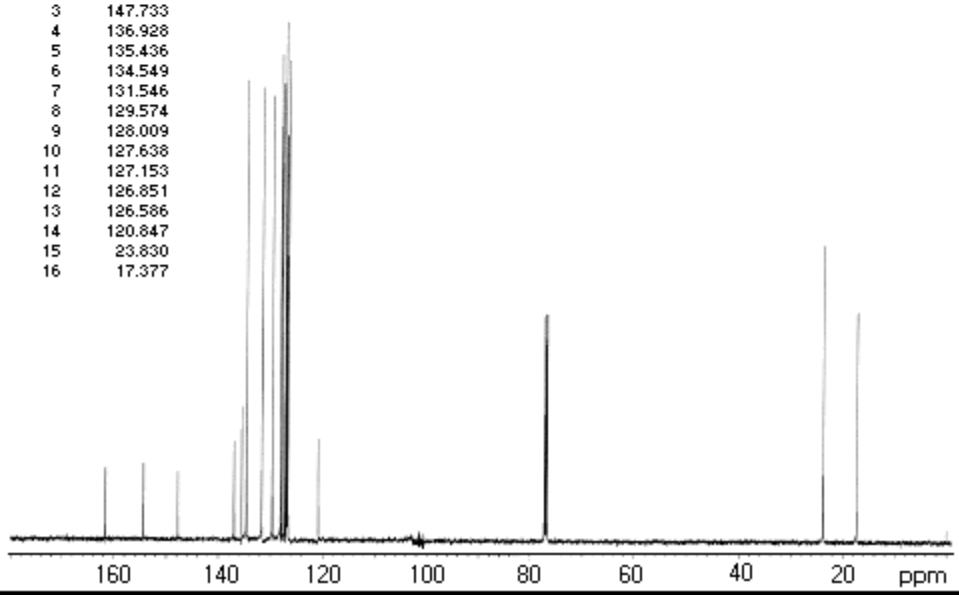

FT-IR
Methaqualone Hydrochloride
70 scans, 1nm resolution
1.5 mg/150 mg KBr
% Transmittance
100
80
60
40
20
4000
3500
3000
2500
2000
1500
1000
500
Wavenumbers
1648.22
1482.43
759.81
579.39

Mass Spectrometry
Methaqualone



Nuclear Magnetic Resonance (carbon)
Methaqualone Base
50 mg/mL in $CDCL_3$ with TMS
125 MHz

PEAK	PPM
1	161.628
2	154.328
3	147.733
4	136.928
5	135.436
6	134.549
7	131.546
8	129.574
9	128.009
10	127.638
11	127.153
12	126.851
13	126.586
14	120.847
15	23.830
16	17.377



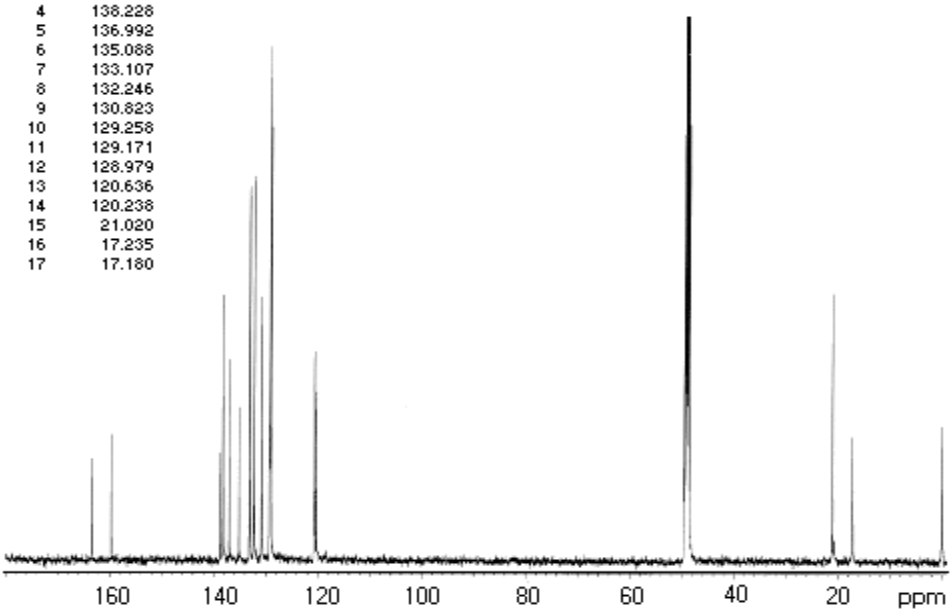
Nuclear Magnetic Resonance (carbon)

Methaqualone Hydrochloride

50 mg/mL in CD_3OD with TMS

125 MHz

PEAK	PPM
1	163.412
2	159.664
3	138.740
4	138.228
5	136.992
6	135.088
7	133.107
8	132.246
9	130.823
10	129.258
11	129.171
12	128.979
13	120.636
14	120.238
15	21.020
16	17.235
17	17.180



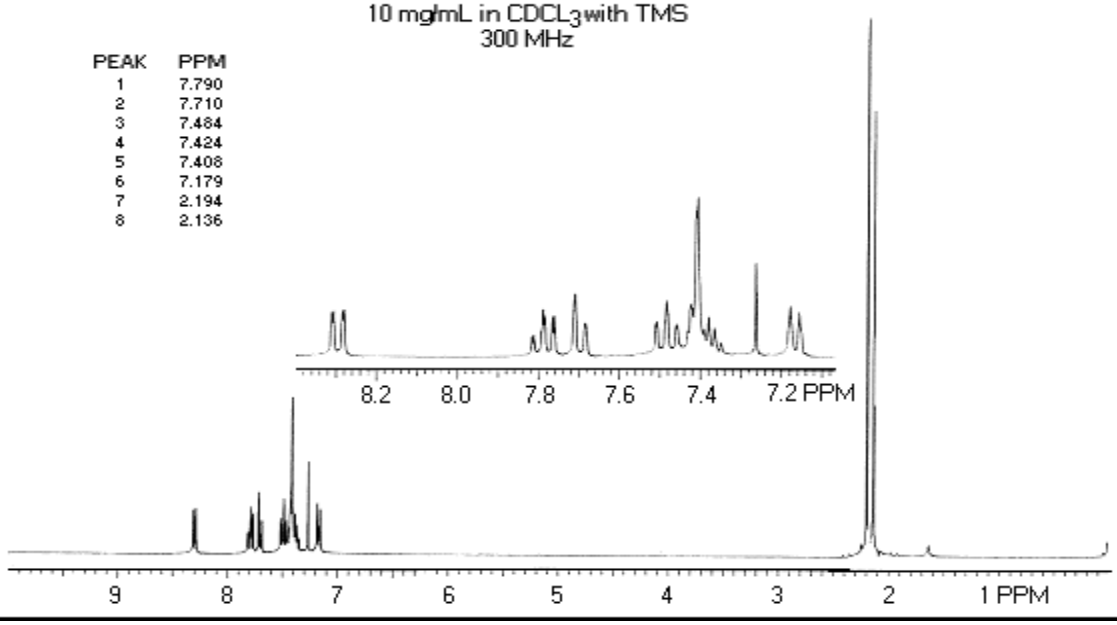
Nuclear Magnetic Resonance (proton)

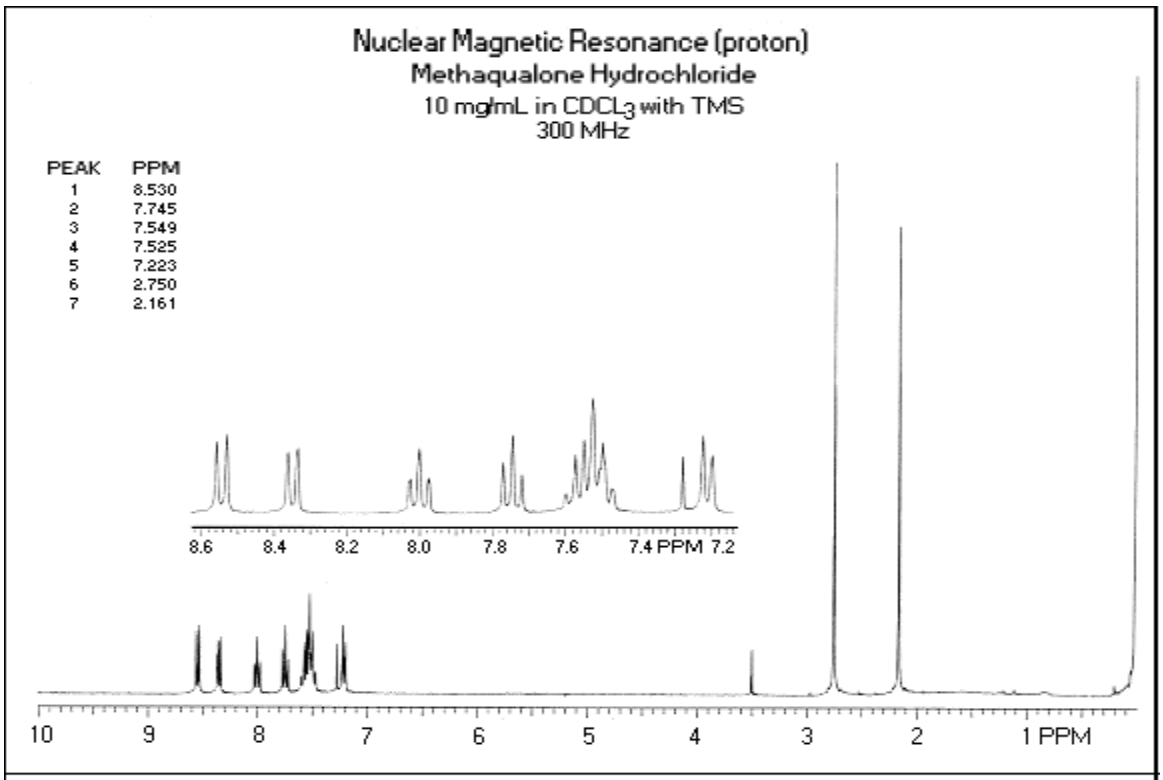
Methaqualone Base

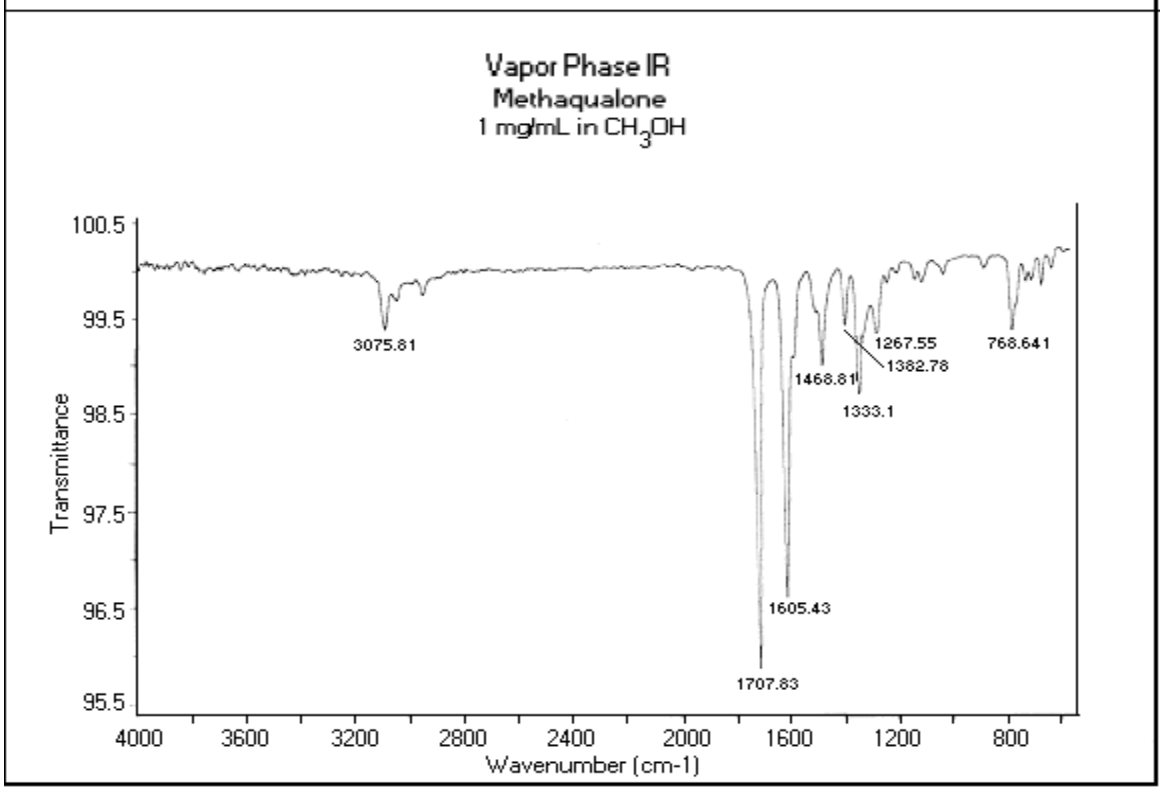
10 mg/mL in $CDCL_3$ with TMS

300 MHz

PEAK	PPM
1	7.790
2	7.710
3	7.484
4	7.424
5	7.408
6	7.179
7	2.194
8	2.136




Nuclear Magnetic Resonance (proton)
Methaqualone Hydrochloride
10 mg/mL in CDCL3 with TMS
300 MHz
PEAK PPM
1 8.530
2 7.745
3 7.549
4 7.525
5 7.223
6 2.750
7 2.161
8.6 8.4 8.2 8.0 7.8 7.6 7.4 PPM 7.2
10 9 8 7 6 5 4 3 2 1 PPM


Vapor Phase IR
Methaqualone
1 mg/mL in CH3OH
Transmittance
100.5
99.5
98.5
97.5
96.5
95.5
3075.81
1707.83
1605.43
1468.81
1333.1
1382.78
1267.55
768.641
4000 3600 3200 2800 2400 2000 1600 1200 800
Wavenumber (cm-1)