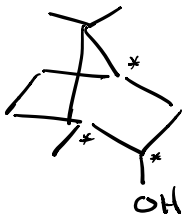
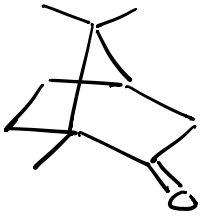
Oxidation Reduction Scheme



(±)-Borneol

1st day

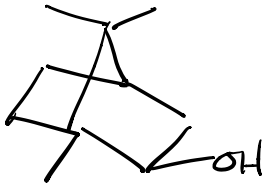
[O]



Camphor

2nd day

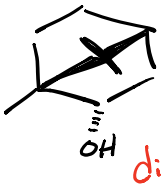
[H]



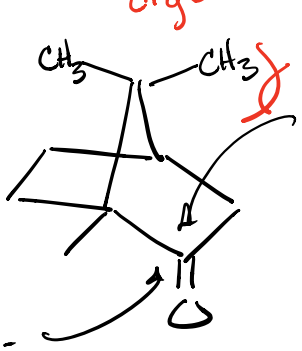
(±) Isoborneol

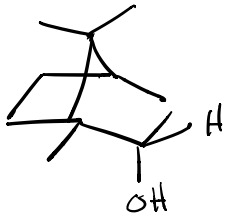
[O] = oxidation

[H] = Reduction



digeminal methyls

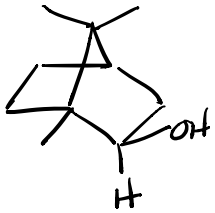




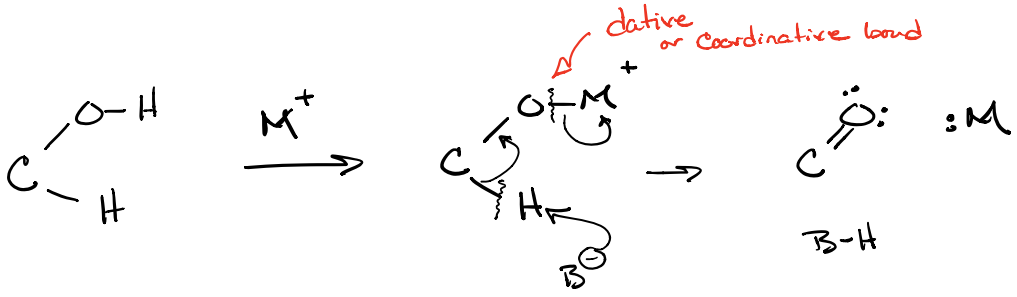
Borneol

Ratios

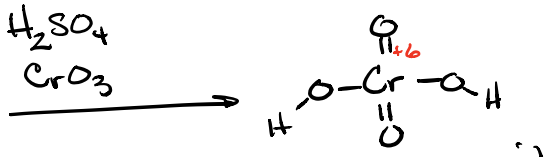
Stereoselectivity



Isoborneol

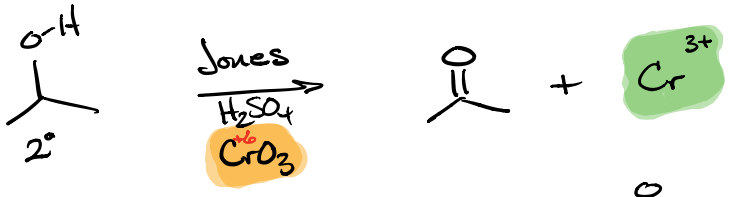


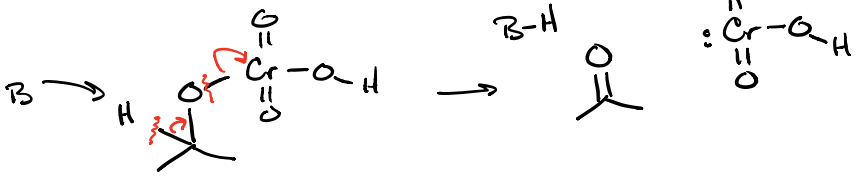
Jones Reagent

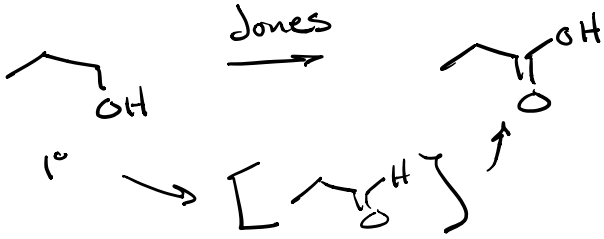


Hexavalent Chromium

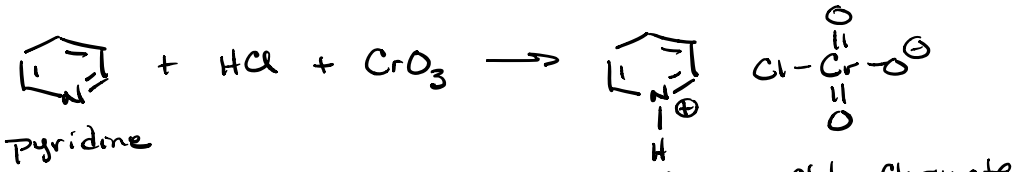
Known Carcinogen

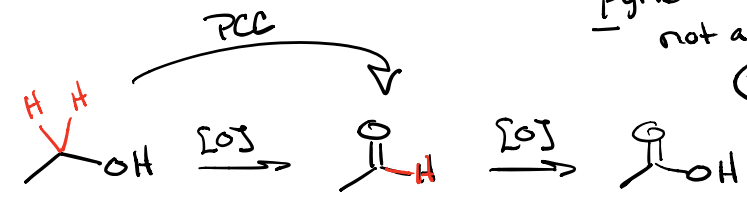


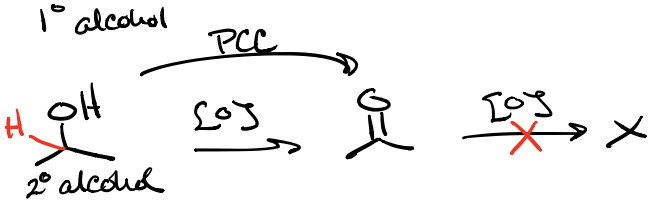


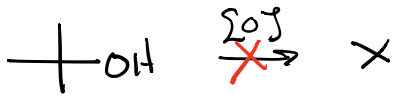


PCC



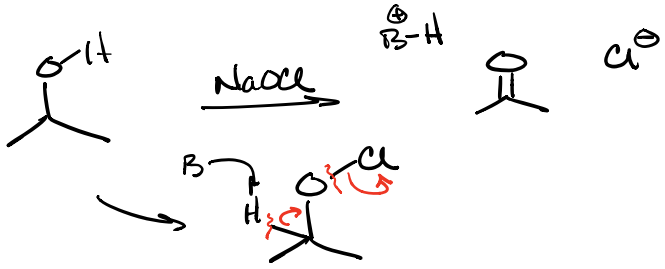


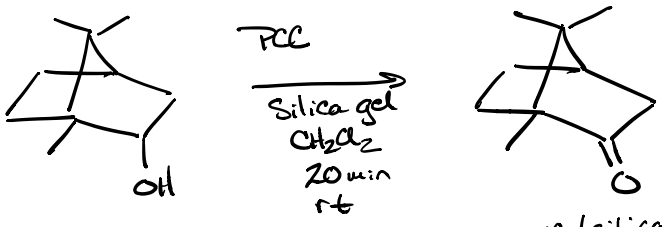


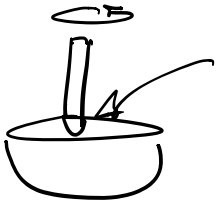


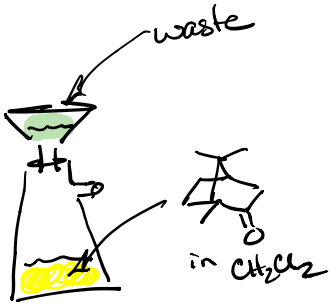
no H's
on C w/ OH

Green Oxidation – Bleach NaOCl







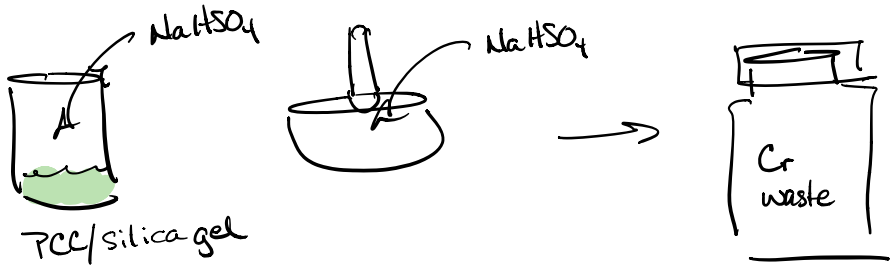


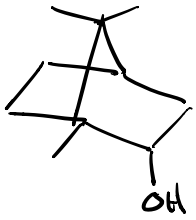
- + 10 mL CH_2Cl_2
- + 0.360 g (2.33 mmol) borneol
- Stir 20 min
- Hirsch filter
- Rinse w/ CH_2Cl_2
- Tare RB
- Roto vap
- Mass % yield
- MP (174°C)
- FTIR

Haz out

$NaHSO_3$ (Reducing agent)

Cr^{6+} $NaHSO_4$ Cr^{3+}



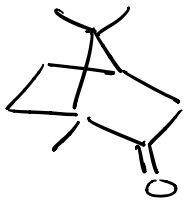


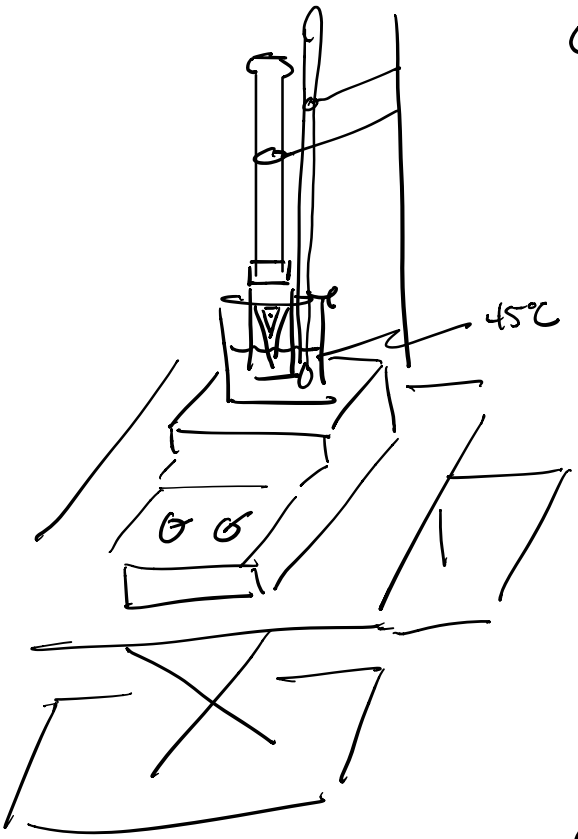
0.360 g
(2.33 mmol)

6.0 mL NaOCl(aq)
(10–15%)

1.0 mL Acetone
0.30 mL glacial AcOH

45°C H_2O bath
35 min

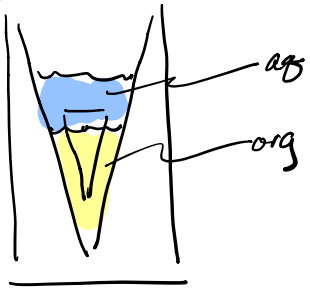




① Add 0.360 g borneol
1.0 mL Acetone
0.30 mL glacial AcOH
Heat w/ Stirring
(add 0.5 mL acetone if not dissolving)

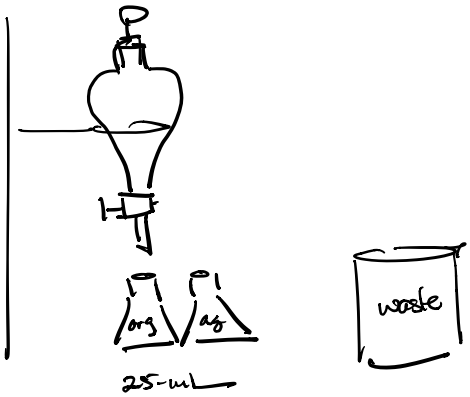
② Add 6 mL NaOCl(aq) in stages over 35 min.

Biphasic Reaction



③ Cool to Rt (drop jackstand)

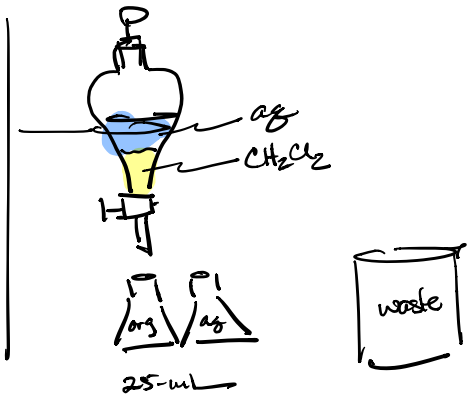
④ Seperatory funnel

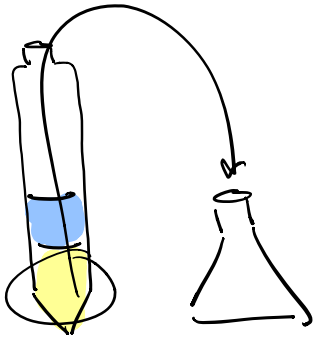


⑤ Extract w/ 2mL CH_2Cl_2

→ (Shake, vent, extract lower layer)

1-2 min





⑥ 2nd extraction of aq w/ 2mL CH_2Cl_2

↳ 4 mL CH_2Cl_2 aquired

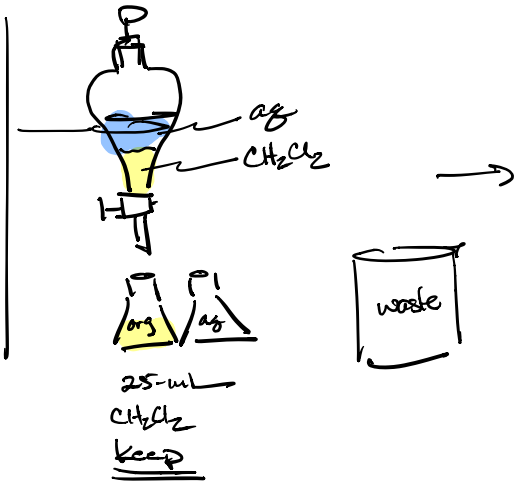
Extraction = Removing Component that we keep

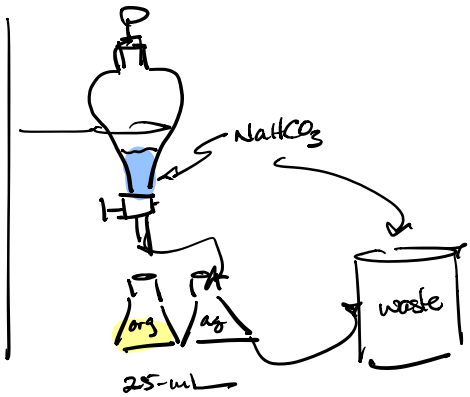
Wash = Removing waste Components

⑦ waste out the aq layer

⑧ Reintroduce the 4 mL CH_2Cl_2 back into the Sep funnel

⑨ Wash CH_2Cl_2 w/ 2.0 mL Sat $NaHCO_3$ ⇒ Caution CO_2(g)



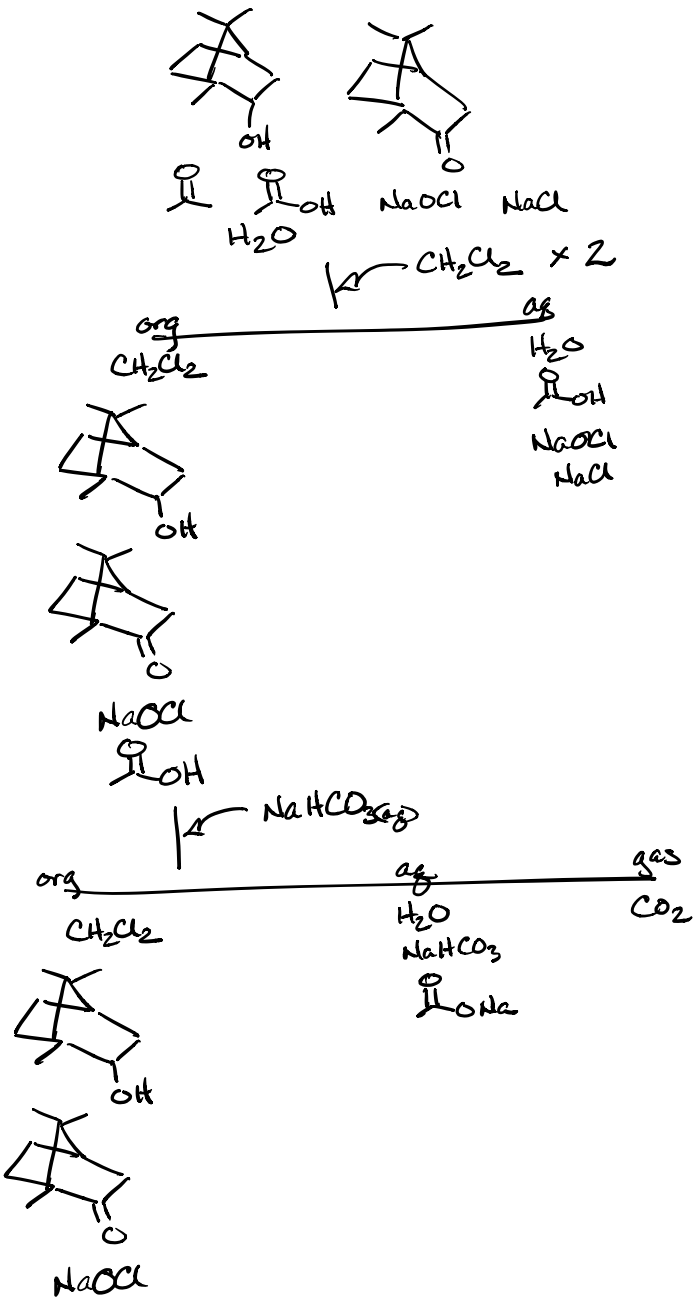


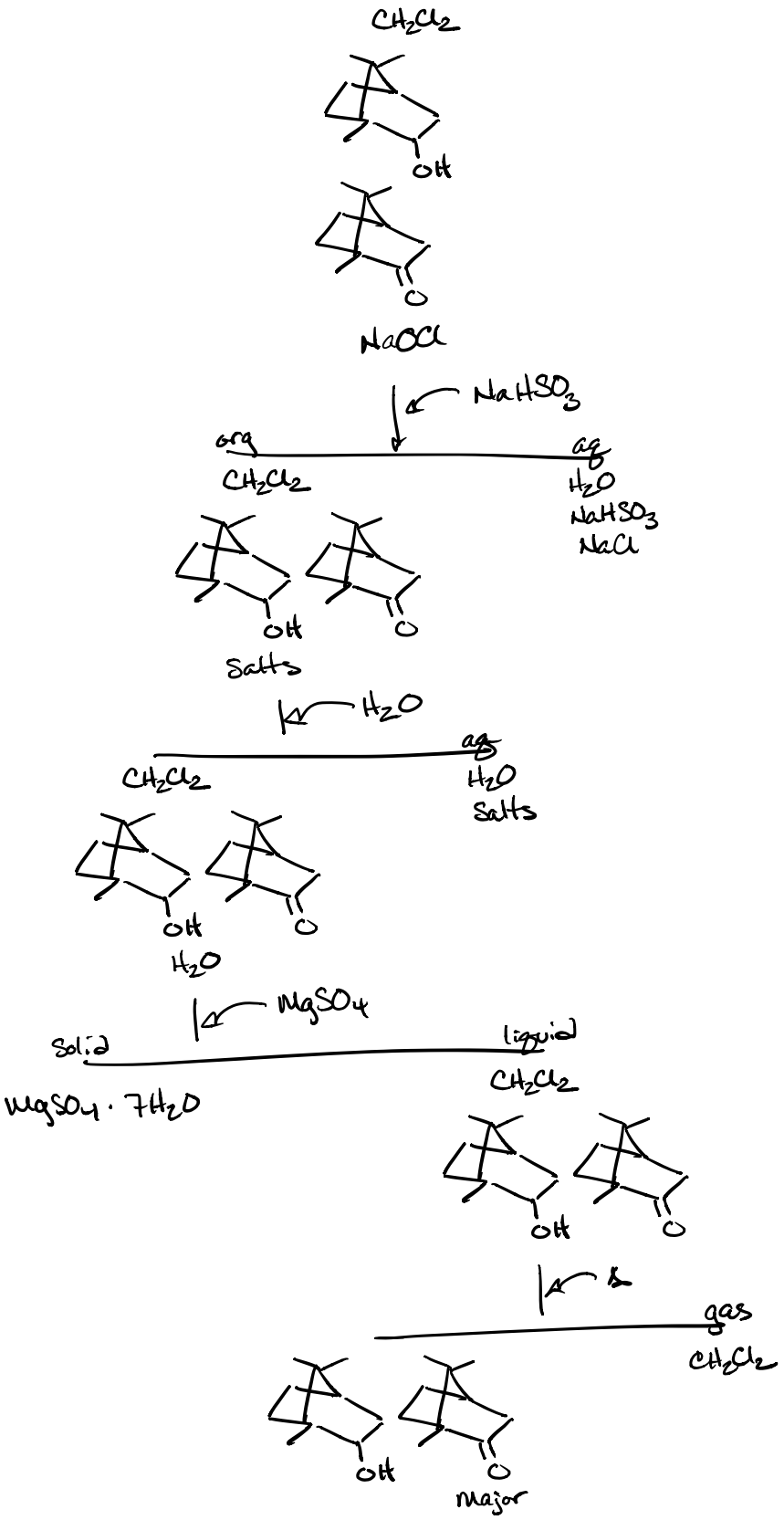
(10) wash CH_2Cl_2 w/ 2mL 5% $NaHSO_{3(aq)}$
- CH_2Cl_2 → Keep
- $NaHSO_{3(aq)}$ → waste

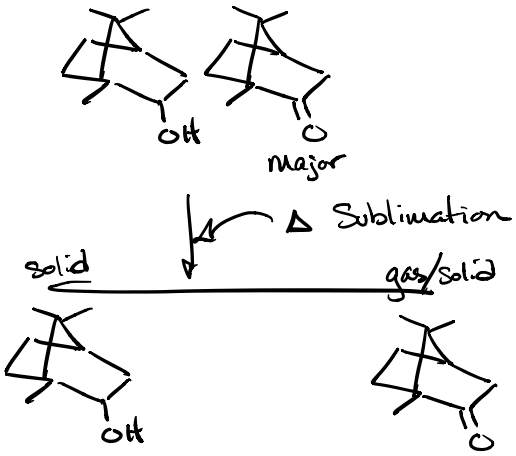
(11) wash CH_2Cl_2 w/ 2.0 DI H_2O
- CH_2Cl_2 → Keep
- H_2O → waste

(12) Dry CH_2Cl_2 w/ $MgSO_4$

(13) Tare RB
decant CH_2Cl_2
Rotovap
mass → % yield
MP (174°C)
IR


OH
OH
H2O
NaOCl
NaCl
CH2Cl2 x 2
org
CH2Cl2
aq
H2O
OH
NaOCl
NaCl
OH
NaOCl
OH
NaHCO3 sat
org
CH2Cl2
aq
H2O
NaHCO3
ONa
gas
CO2
OH
NaOCl


CH_2Cl_2
OH
O
NaOCl
$NaHSO_3$
org
CH_2Cl_2
aq
H_2O
$NaHSO_3$
NaCl
OH
O
Salts
H_2O
CH_2Cl_2
aq
H_2O
Salts
OH
O
H_2O
$MgSO_4$
Solid
$MgSO_4 \cdot 7H_2O$
liquid
CH_2Cl_2
OH
O
Δ
gas
CH_2Cl_2
OH
O
Major

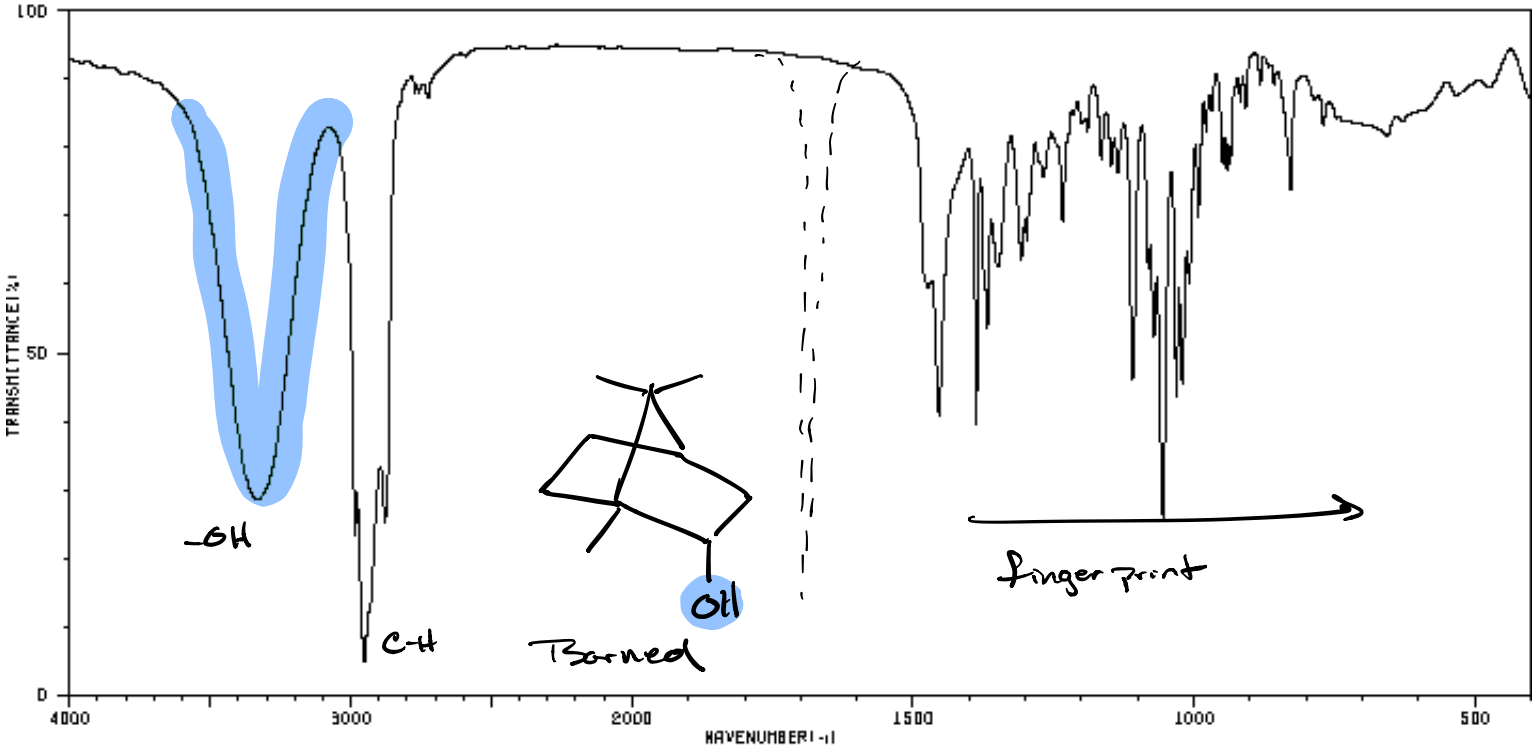

OH
O
major
Δ Sublimation
solid
gas/solid
OH
O

HIT-NO=1628	SCORE= ( )	SDBS-NO=1694	IR-NIDA-61092 : KBR DISC

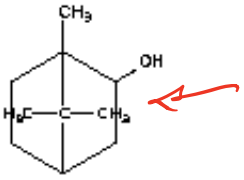
BORNEOL

Starting material

$C_{10}H_{18}O$



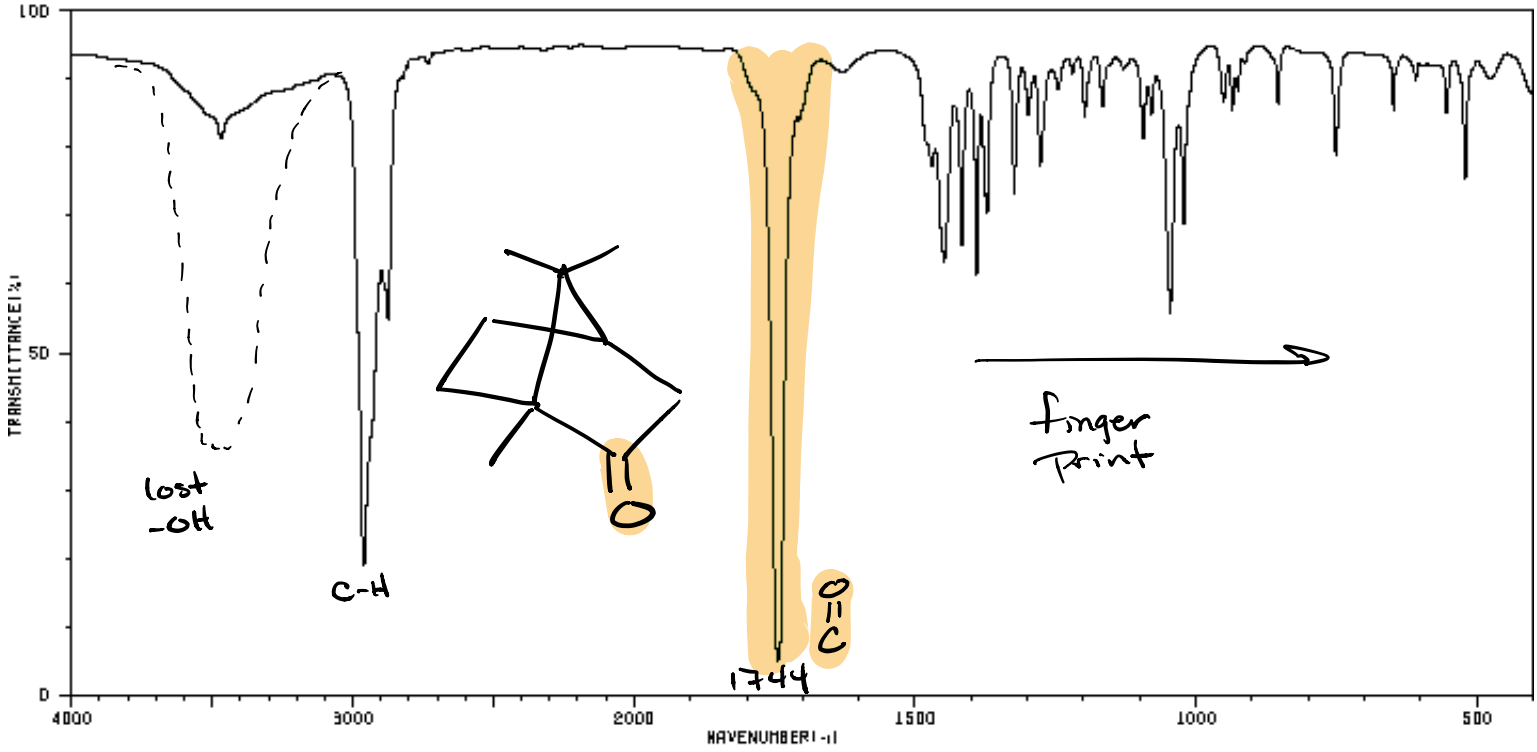
3331	27	1360	60	1166	74	1032	42	942	74
2984	22	1308	60	1148	74	1021	43	935	74
2951	4	1298	64	1136	74	1009	58	909	61
2879	23	1269	72	1110	44	992	68	841	81
1454	39	1234	66	1081	60	978	79	828	70
1388	38	1199	79	1071	50	969	81	770	79
1368	62	1190	79	1066	25	949	74	666	79



HIT-NO=2976	SCORE= ( )	SDBS-NO=4329	IR-NIDA-18067 : KBR DISC

(+)-CAMPHOR

$C_{10}H_{16}O$



3469	79	1391	68	1193	86	936	81	621	72		
2961	18	1372	68	1167	81	926	84				
2874	52	1324	70	1094	79	854	84				
1744	4	1300	81	1079	81	761	77				
1470	74	1277	74	1046	53	649	81				
1449	80	1245	84	1022	86	610	86				
1417	64	1199	81	961	84	566	81