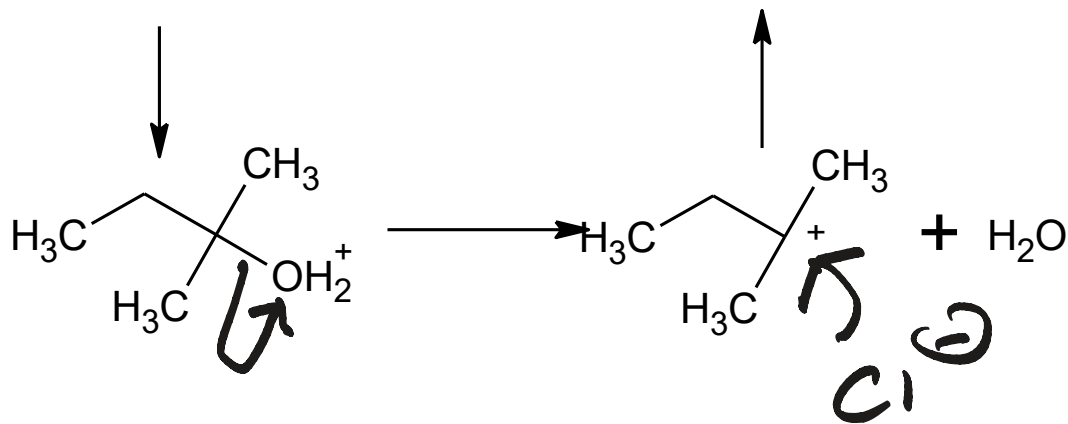
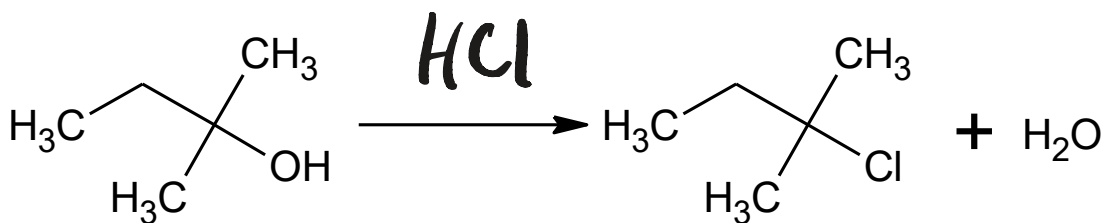


Nucleophilic Substitution

220C

10/8/20 



NaCl

12.5 mL

Wash

70% yield

65%

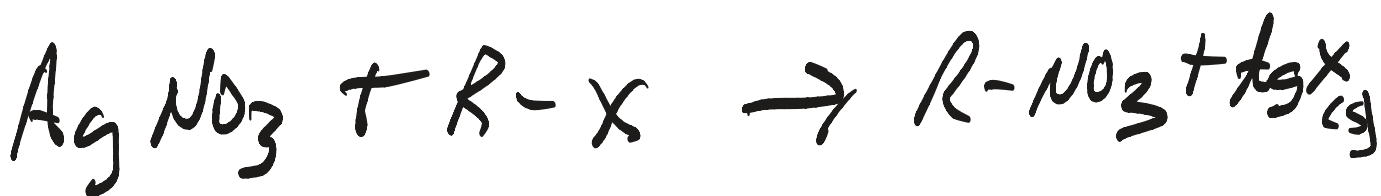
30-50

Halide test, IR

$\text{S}_\text{N}2$



$\text{S}_\text{N}1$



I R

C-C



C-H

C=O

C-OH

Functional group
Region4000 cm⁻¹1250 cm⁻¹

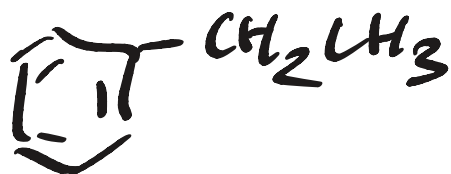
TABLE IR.1 A Simplified Correlation Table

Type of Vibration			Frequency (cm ⁻¹)	Intensity
C-H	Alkanes	(stretch)	3000-2850	s
	-CH ₃	(bend)	1450 and 1375	m
	-CH ₂ -	(bend)	1465	m
	Alkenes	(stretch)	3100-3000	m
		(bend)	1700-1000	s
	Aromatics	(stretch)	3150-3050	s
		(out-of-plane bend)	1000-700	s
	Alkyne	(stretch)	ca. 3300	s
	Aldehyde		2900-2800	w
			2800-2700	w
C-C	Alkane	Not interpretatively useful		
C=C	Alkene		1680-1600	m-w
	Aromatic		1600-1400	m-w
C≡C	Alkyne		2200-2100	m-w
C=O	Aldehyde		1740-1720	s
	Ketone (acyclic)		1725-1705	s
	Carboxylic acid		1725-1700	s
	Ester		1750-1730	s
	Amide		1700-1640	s
	Anhydride		ca. 1810	s
			ca. 1760	s
C-O	Alcohols, ethers, esters, carboxylic acids		1300-1000	s
O-H	Alcohol, phenols			
	Free		3650-3600	m
	H-Bonded		3400-3200	m
	Carboxylic acids		3300-2500	m
N-H	Primary and secondary amines		ca. 3500	m
C≡N	Nitriles		2260-2240	m
N=O	Nitro (R-NO ₂)		1600-1500	s
			1400-1300	s
C-X	Fluoride		1400-1000	s
	Chloride		800-600	s
	Bromide, iodide		< 600	s

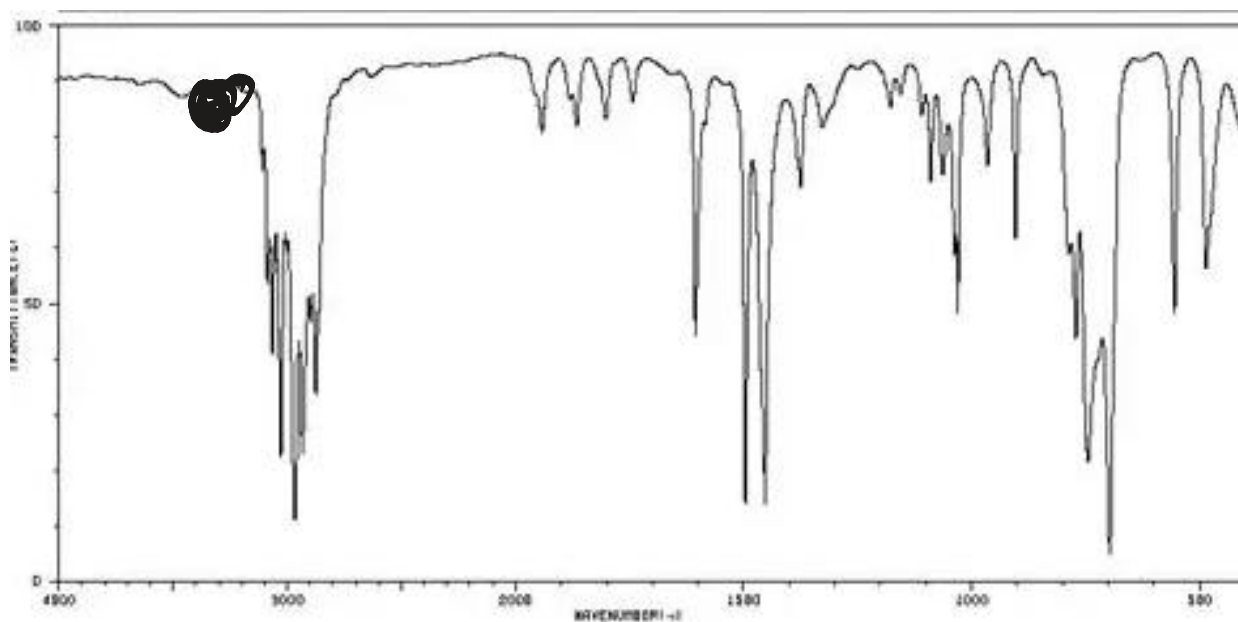
Hydrogen
bonds

NOTE: s, strong; m, medium; w, weak.

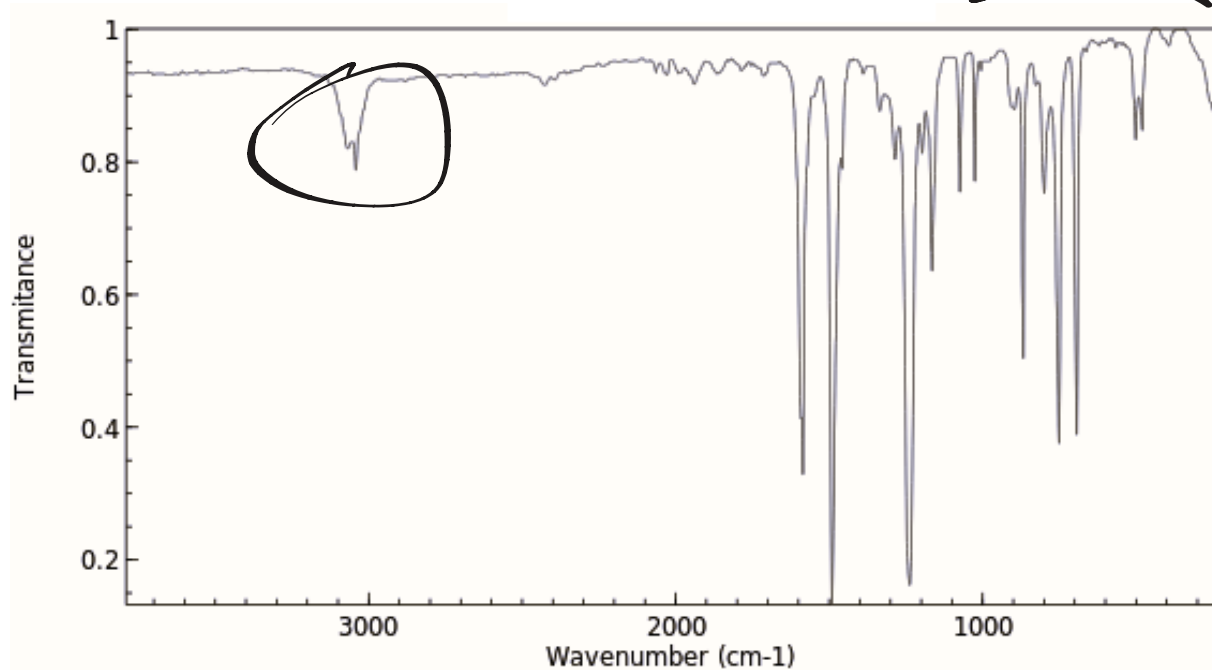
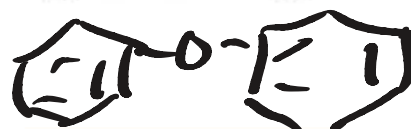
Peak Frequency vs Peak Intensity



Ethyl Benzene

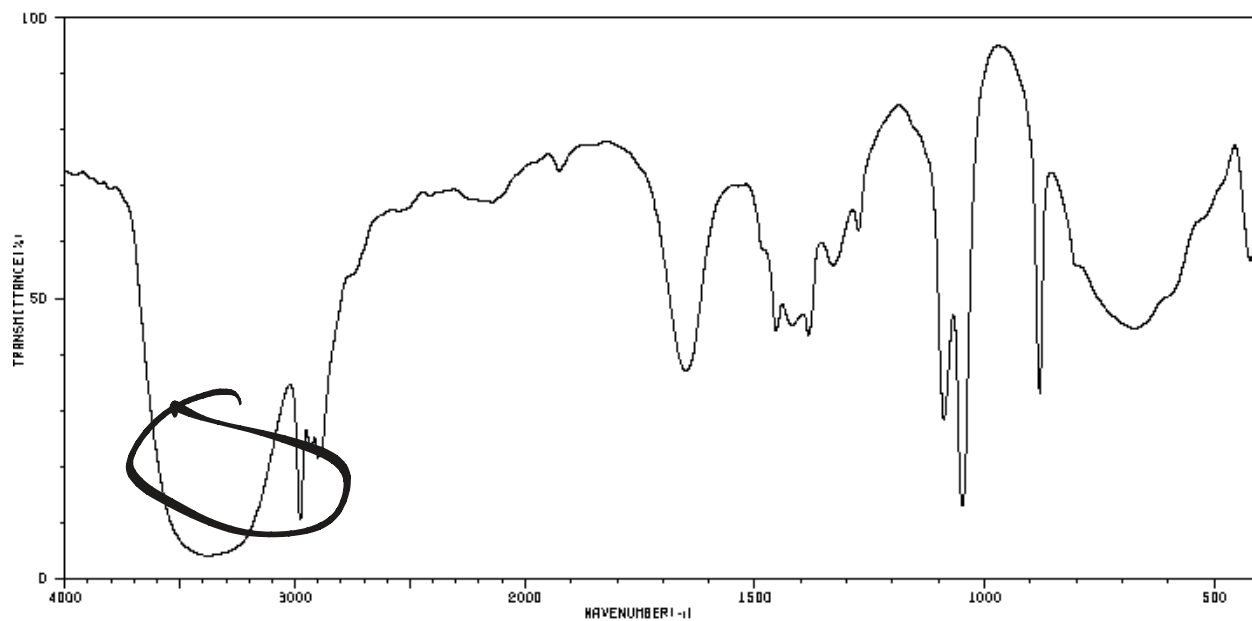


Diphenyl Ether

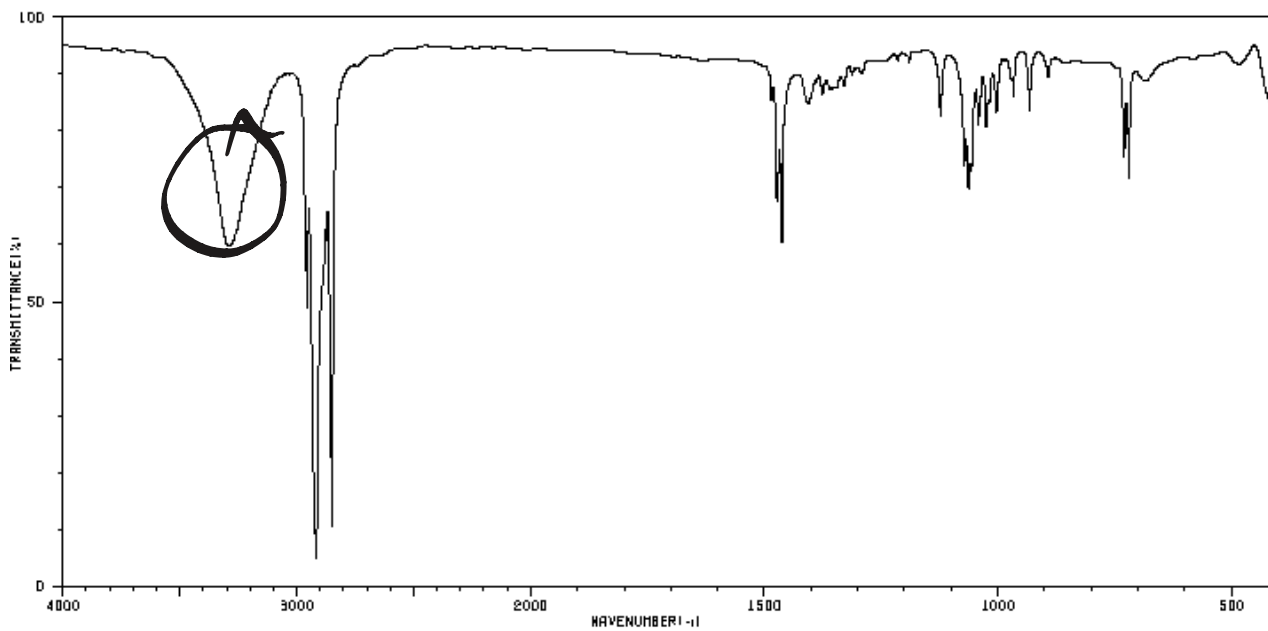




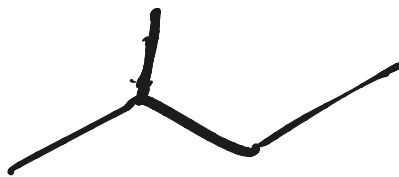
Ethanol



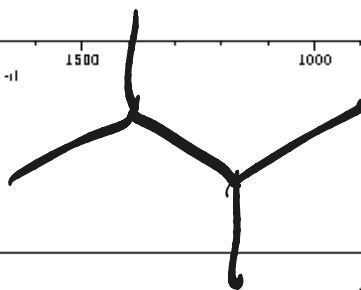
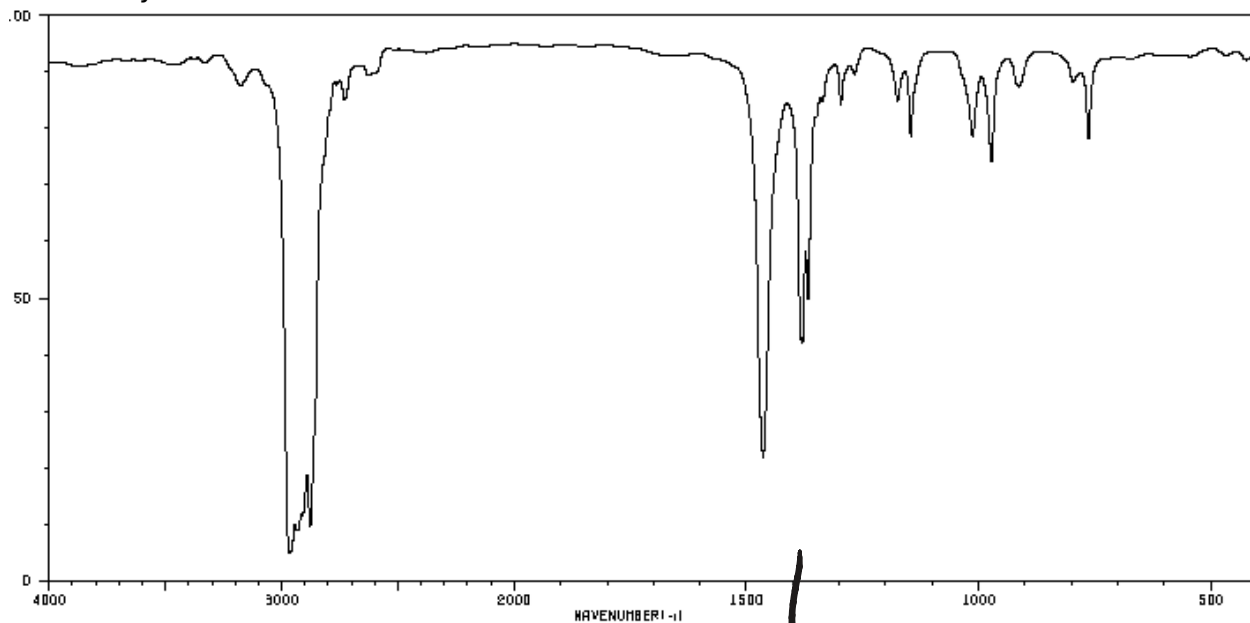
Tetradecanol



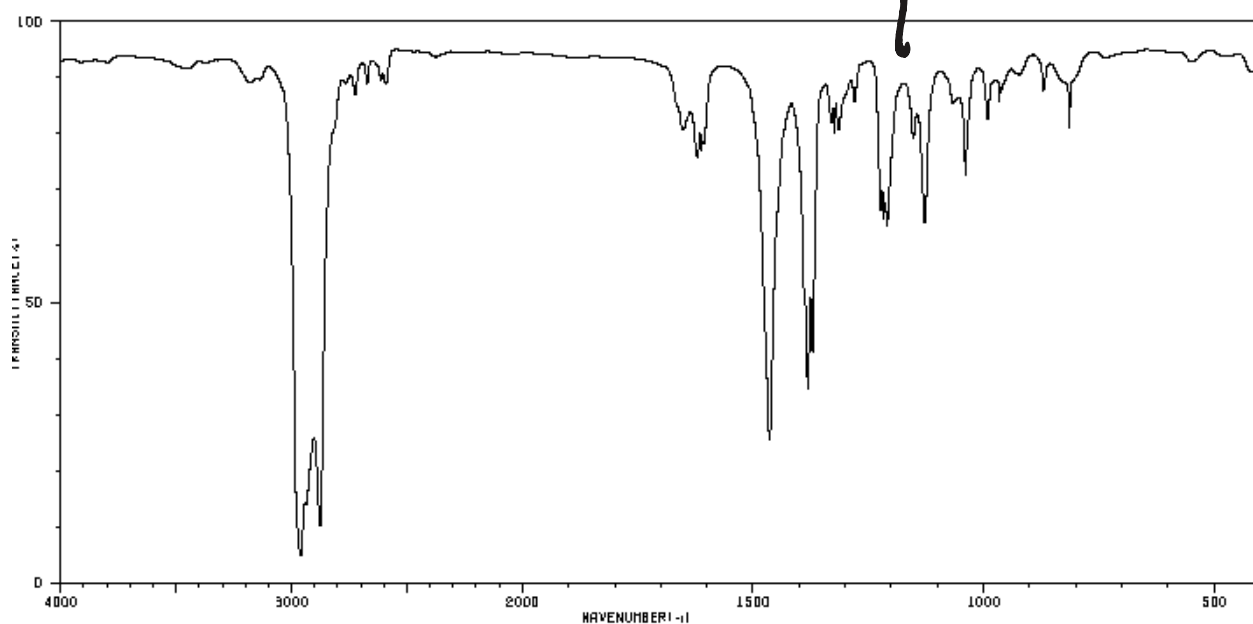
Fingerprint Region



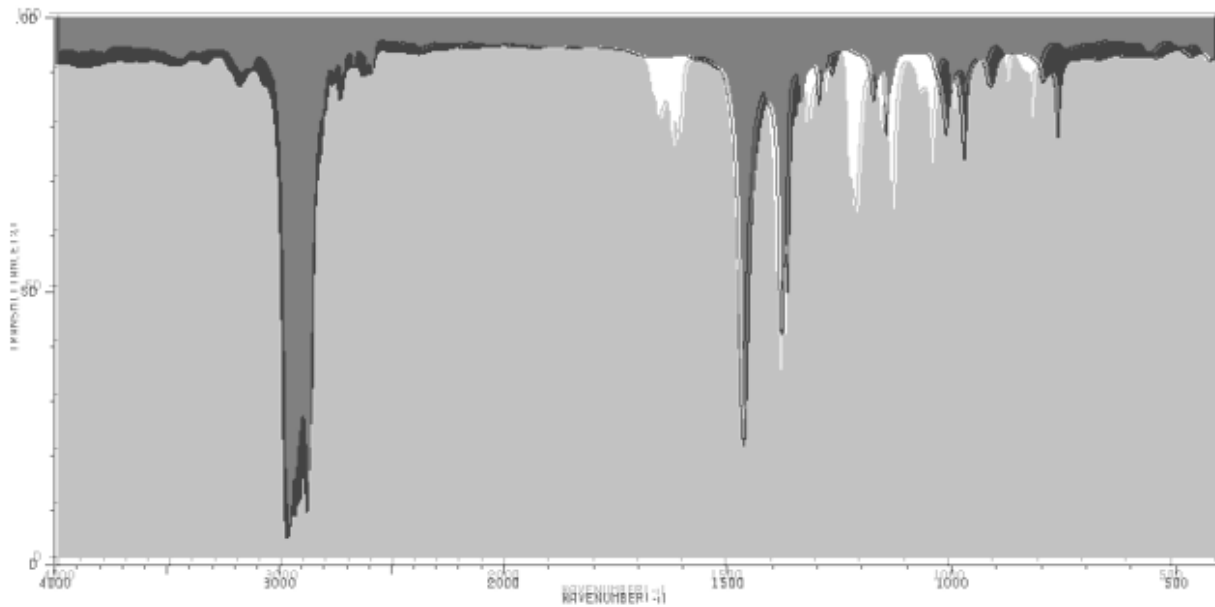
2-methylbutane



2,3-dimethylbutane



Overlay



1. Clean area
2. Clean instrument
3. Follow instructions
4. Look IR

