1. Major funtional group bands in IR spectrum. are :-

$CH_3$ next to O

$CH_3$ next to C=O

$(CH_3)_2$ next to CH

2. Assign all Peaks in the NMR spectrum.

| Signal | δ | Intergration | Multiplicity | Comments. |
|---|---|---|---|---|
| | -4.3 | 1H | M | CH-O |
| | -2.0 | 3H | S | $CH_3$-C=O |
| | -1.3 | 6 H | d | $(CH_3)_2$-CH. |

Assign as many peaks as possible in C-13 spectrum.

C=O (in ketones) 205-220

C=O (in aldehydes 190-200

C=O (in acids and esters) 170-185

C in aromatic rings 125-150

C=C in alkenes 115-140

$R-CH_3$ 10-15

$R_2CH_2$ 16-25.

2. Based on IR, H-NMR and C-13 NMR spectra for the product the funtional groups include CH-O, $CH_3$-, C=O, $(CH_3)_2$-CH

3. Based on the assignments made in Q1 & Q2 some key bands that can be used to verify that the product was formed are . CH-

$(CH_3)_2$

C=O

4. Using the Williamson synthesis other synthesis how can you make the phenyl benzyl ether.

By SN2 reaction in which a metal alkoxide displaces a halide ion from an alkyl halide. The alkoxide is prepared by the reaction of an alcohol with a strong base such as sodium hydride.