

Essential NMR Spectrometer for Fischer esterification

Fischer esterification is an important class of reactions for synthesizing esters from carboxylic acids and alcohols. Using simple acids and alcohols students experience the wonder of chemistry by synthesizing familiar and fragrant esters, such as banana oil (3-methylbutyl acetate). In many undergraduate organic chemistry teaching labs, Fischer esterification is an essential lab often forming the core curriculum. NMR is a powerful tool to confirm the results of the synthesis. The Thermo Scientific™ picoSpin™ 45 NMR spectrometer is an affordable bench-top NMR spectrometer that allows students a hands-on experience with the power of NMR.

- Compact 45 MHz ^1H pulsed FT NMR spectrometer
- High performance, high resolution, lightweight and portable
- 4.8 kg (10.5 lbs) total weight
- 20.3 cm \times 14.6 cm \times 29.2 cm (8" \times 5.75" \times 11.5")
- 30 microliter sample volume
- Replaceable capillary cartridge
- Ethernet interface
- Web server GUI
- Includes a 1-yr Mnova™ NMR suite license



**Introducing the Thermo Scientific
picoSpin 45 NMR spectrometer**



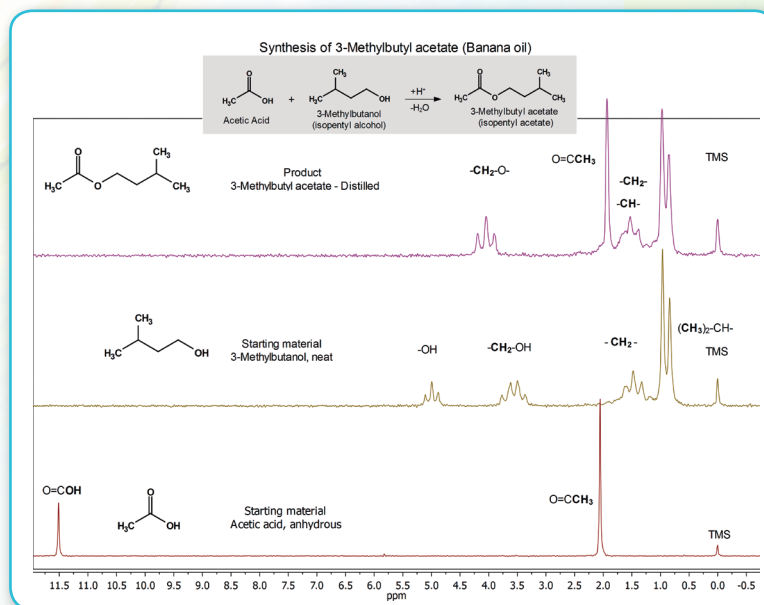
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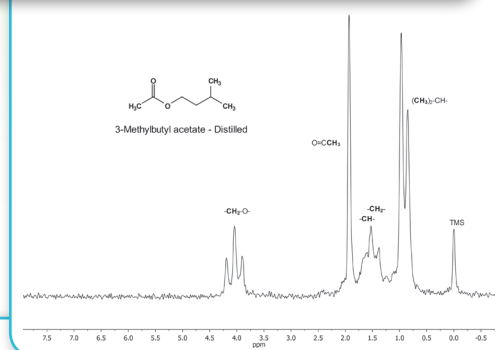
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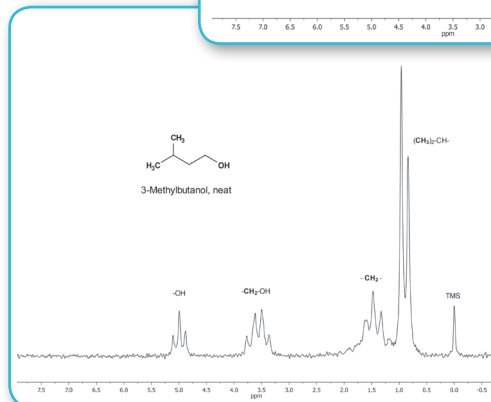
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NMR spectrometer



Distilled 3-methylbutyl acetate product (top, 16 scans); Reactants 3-methylbutyl acetate (middle, 16 scans) and anhydrous acetic acid (bottom, 16 scans).



Product: 3-Methylbutyl acetate (distilled, 16 scans): 1H NMR (44 MHz) δ 4.05 (t, $J = 6.3$ Hz, 2H), 1.93 (s, 3H), 1.90–1.02 (m, 3H), 0.97 (s, 3H), 0.85 (s, 3H).



Reactant: 3-Methylbutyl alcohol (neat, 16scans): 1H NMR (44 MHz) δ 4.99 (t, $J = 5.0$ Hz, 1H), 3.56 (q, $J = 6.1$ Hz, 2H), 1.85–0.95 (m, 3H), 0.96 (s, 3H), 0.84 (s, 3H).

Ordering Information

Description	Part Number
picoSpin 45 NMR Spectrometer	14-385-160
picoSpin 45 NMR Spectrometer (19 Fluorine)	14-385-162

Optional Software and Accessories	Part Number
Mnova Industrial Perpetual License – NMR Software	14-385-176
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