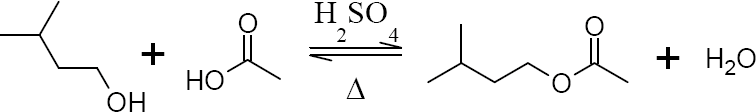
**Title:** Synthesis of Isopentyl Acetate (Banana Oil)

**Objective:** Esterification reaction and purification by distillation

**Reference:** Pavia, Lapman, Kriz, Enegel, “Introduction to Organic Laboratory Techniques: A Microscale Approach” 3rd Edition, 1999; Saunders

**Reaction:**



**Reagents:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Substance** | **Mass** | **Volume** | **Molar Mass** | **Millimoles** |
| Acetic acid (excess) |  | 1.50 mL | 60 g/mol |  |
| Isopentyl alcohol | 0.829 g | 1.00 mL | 88 g/mol | 9.42 mmol |
| Sulfuric acid (conc) |  | 3 drops | 98 g/mol |  |

Yield isopentyl acetate 0.163 g, 1.25 mmol / 9.42 mmol = 13.3%  
B.P. 138°C (Ref. 142°C)

**Procedure, Observations, and Data:**   
Isopentyl alcohol (1.00 mL, 0.829 g), glacial acetic acid (1.5 mL), and concentrated sulfuric acid (3 drops) added to 5 mL conical vial. Attached water-cooled condenser to create reflux apparatus. Heated (150-160°C, sand bath) for 75 minutes in sand bath under reflux. Cooled to room temperature. Treated with 3mL 5% NaHCO3 in 3 portions until bubbling stopped, removing aqueous layers between treatments. Dried (anhydrous NaSO4) and let sit for 15 minutes. Transferred to 5mL conical vial with spin vane, fitted with Hickman still and water-cooled condenser. Heated (180°C, sand bath), collected first fraction (138°C, also used this value for boiling point) of 0.163g (13.3% yield). IR showed that product had 98.53% match to class. 1H NMR (CDCl3) δ 0.88 (s, 3 H, CH3), 0.90 (s, 3 H, CH3), 1.49 (q, 2 H, CH2), 1.68 (m, 1 H, CH), 2.00 (s, 3 H, CH3), 4.05 (t, 2 H, CH2). IR 2958, 2872, 1739, 1465, 1387, 1367, 1220, 1171, 1055, 1029, 961, 818 cm-1.

**Results and Discussion:**   
Vial was tipped over when adding NaHCO3 solution, and most of product was lost, so yield was low. IR indicated an ester with a C=O stretch at 1739 cm-1, with an absence of an O-H stretch. 1H NMR also showed the methyl group on the carbonyl side of the ester at δ 2.00. All of the 1H NMR peaks matched literature (Sigma-Aldrich), confirming that the product is isopentyl acetate.