

東海大學

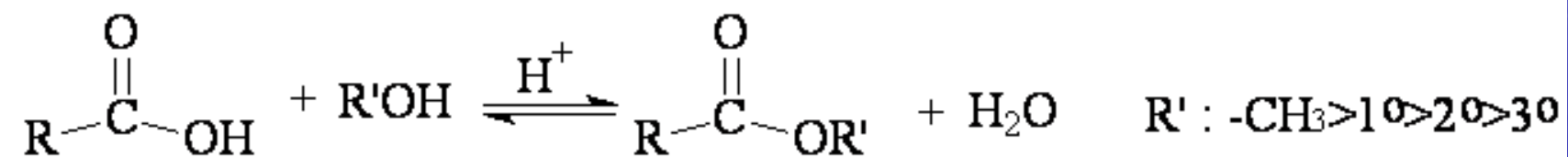
TUNG HAI UNIVERSITY

有機化學實驗

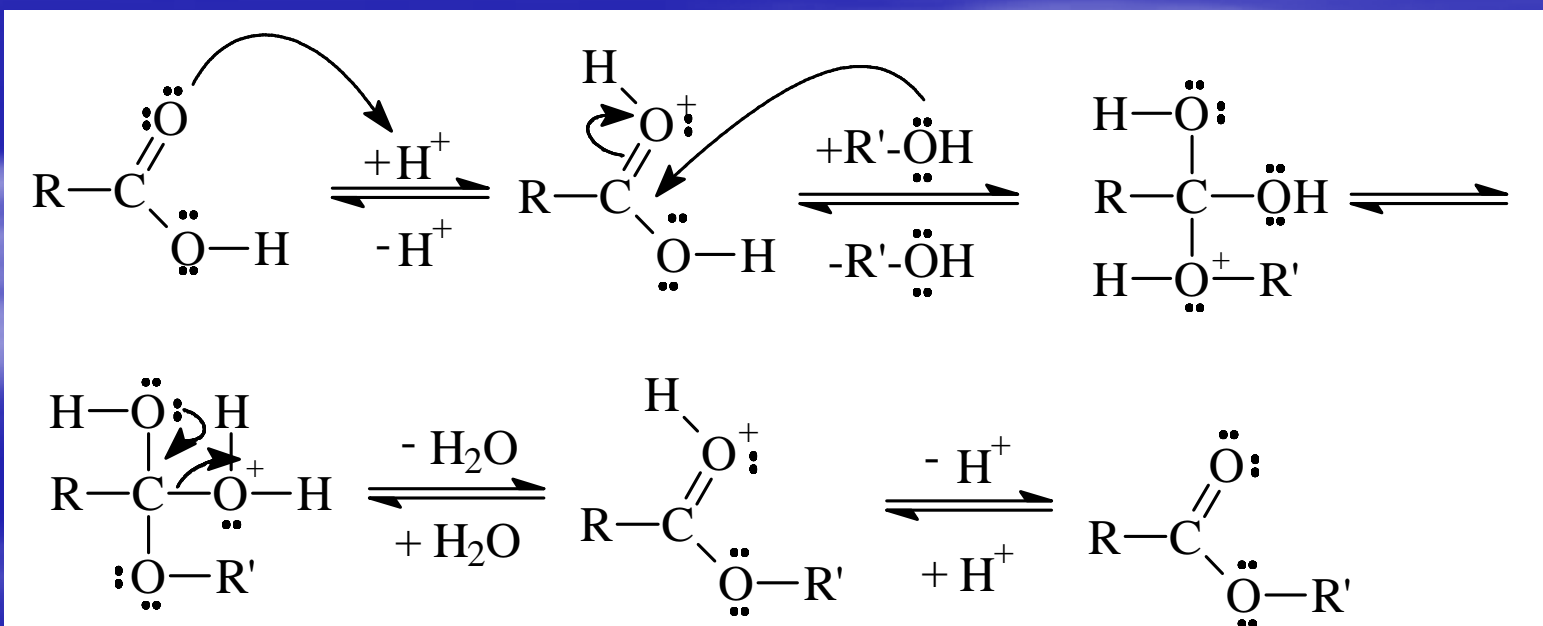
Fischer Esterification

費希爾的酯化反應

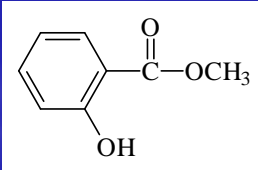
1. Esterification :



2. Mechanism:

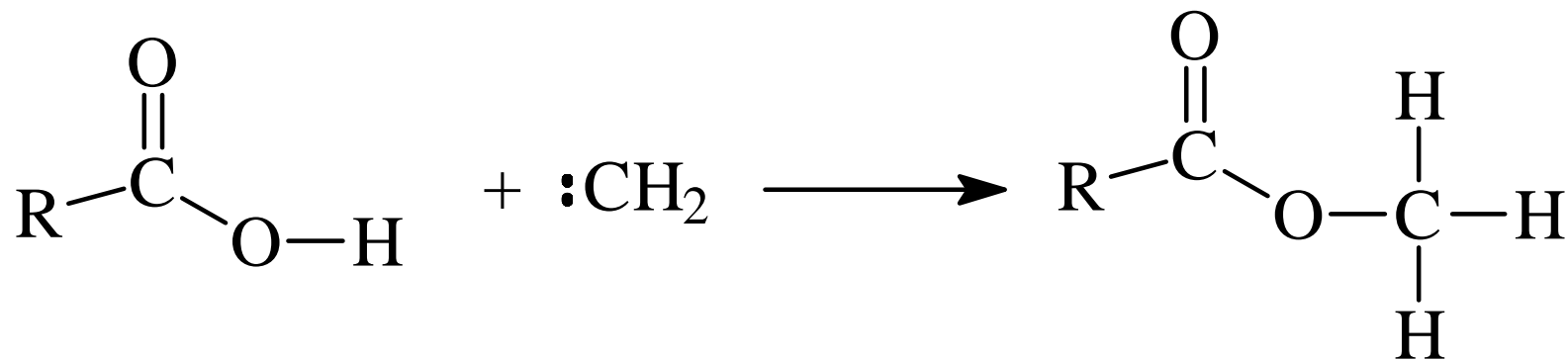


3. Fragrances and boiling points of esters

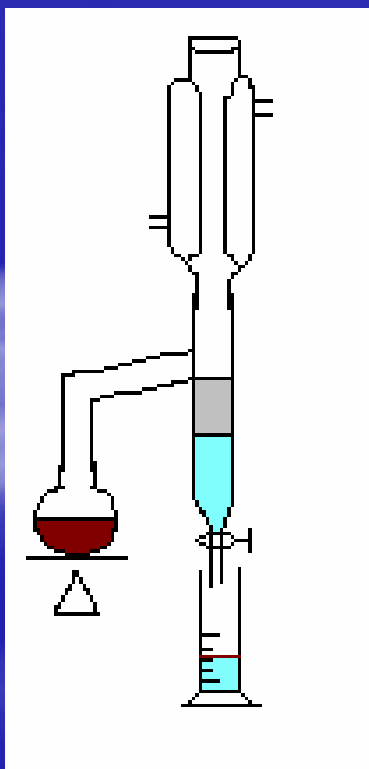
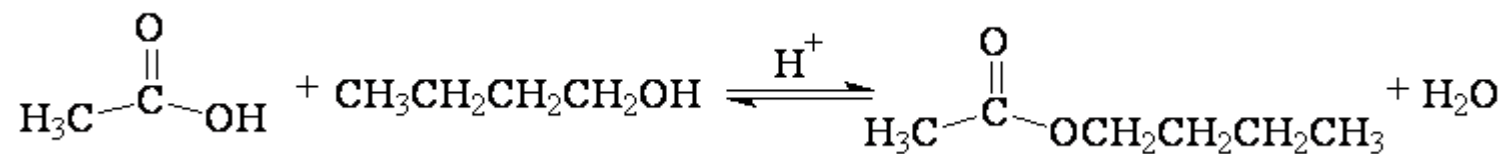
Ester	Formula	b.p.(°C)	Fragrance
Isobutyl formate	$\begin{array}{c} \text{O} \qquad \text{CH}_3 \\ \parallel \qquad \\ \text{HC}-\text{OCH}_2\text{CHCH}_3 \end{array}$	98.4	Raspberry
<i>n</i> -Propyl acetate	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{C}-\text{OCH}_2\text{CH}_2\text{CH}_3 \end{array}$	101.7	Pear
Isobutyl propionate	$\begin{array}{c} \text{O} \qquad \text{CH}_3 \\ \parallel \qquad \\ \text{CH}_3\text{CH}_2\text{C}-\text{OCH}_2\text{CHCH}_3 \end{array}$	136.8	Rum
Isoamyl acetate	$\begin{array}{c} \text{O} \qquad \text{CH}_3 \\ \parallel \qquad \\ \text{CH}_3\text{C}-\text{OCH}_2\text{CH}_2\text{CHCH}_3 \end{array}$	142	Banana
Methyl salicylate		222	Wintergreen

4. Other methods are available for the synthesis of esters:

Insertion

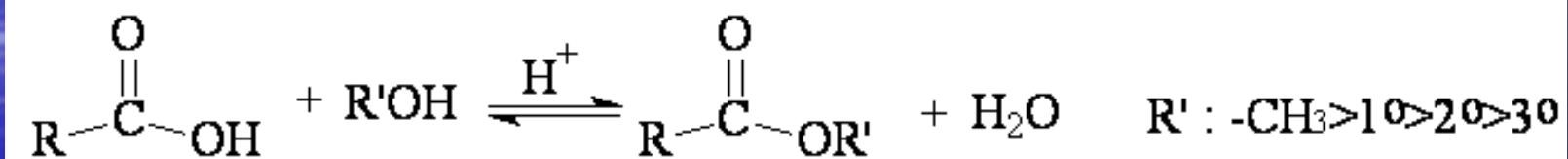


5. Dean-Stank Trap :



$$K_{eq} = \frac{[\text{n-BuOAc}] [\text{H}_2\text{O}]}{[\text{n-BuOH}] [\text{HOAc}]}$$

Reaction equation:



0.02mol carboxylic acid + 0.04mol Alcohol
in a 50mL R.B. flask

↓(ice-water bath)

add 1mL conc. H₂SO₄ dropwise

↓

swirl to mix the components

↓

reflux for 30min (stirring bar)

↓

cool the solution



decant it into a separatory funnel containing 10mL H₂O



rinse the flask with 7mL ether



shake thoroughly and drain off the water layer



wash with 10mL H₂O



(pour the organic layer)

wash with 10mL 5% Na₂CO₃ (to remove the unreacted H₂SO₄)

shake until no further reaction is apparent (no more CO₂ produced)

↓(pour the organic layer)

wash with 10mL saturated NaCl (aq)

↓

collect the organic layer and dry it with MgSO₄(anhy)

↓

filter

↓

distill to collect the material (b.p. $\pm 5^{\circ}\text{C}$ of the ester)

↓

weight

↓

calculate the % yield (result report)

Check out

1. 繳交產物並告知產物淨重。
2. 實驗問題：1, 2