

Ethanoic acid-1-butyl ester

| <u>Chemicals</u> | <u>Material</u> |
|--|---|
| <ul style="list-style-type: none"> • Acetic acid 100% • Butan-1-ol • Sulfuric acid, conc. • Sodium carbonate-solution (w=10%) • Sodium sulphate • Water, dest. | <ul style="list-style-type: none"> • 500 ml multiple neck flask • Separating funnel • Beaker glasses • Liquid funnel • Measuring cylinder (2x 100 ml) • Pipette with pipetting aid • Heating plate with magnetic stirrer • Mixing blade • Water separator • Safety gloves • Reflux condenser |






Safety tips



- wear protection goggles

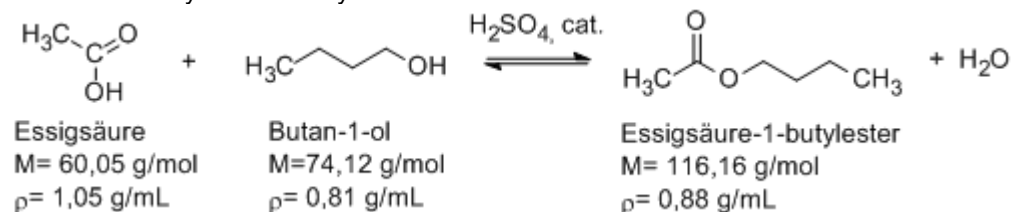


- wear adequate safety gloves

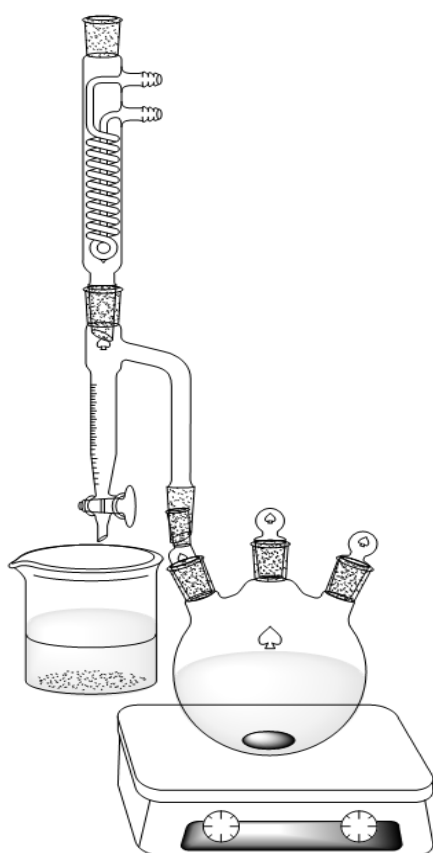
| | |
|--|---|
| <u>Acetic acid 100%:</u> <ul style="list-style-type: none"> - H226, H314 - P210, P243, P280, P301+P330+P331, P304+P340, P309+P310 - HAZARD!!  | <u>Butan-1-ol:</u> <ul style="list-style-type: none"> - H226, H302, H335, H315, H318, H336 - P210, P243, P280, P302+P352, P304+P340, P305+P351+P338, P309+P310 - HAZARD!!  |
| <u>Sulfuric acid, conc.</u> <ul style="list-style-type: none"> - H314, H290 - P280, P301+P330+P331, P305+P351+P338, P309+P310 - HAZARD!!  | <u>Sodium carbonate:</u> <ul style="list-style-type: none"> - H319 - P280, P305+P351+P338 - ATTENTION!!  |
| <u>Ethanoic acid -1-butyl ester:</u> <ul style="list-style-type: none"> - H226, H336 - EUH066 - P210, P243, P280, P304+P340, P312 - HAZARD!!  | |

Reaction equation

Esterification by acidic catalysis:



Experimental procedure



- Place 1 Mol acetic acid , 0.8 Mol butan-1-ol and 1 mL conc. sulfuric acid in a 500 mL multiple neck flask with stirring apparatus, reflux condenser and water separator
- Reflux \rightarrow until no more reaction water is formed
- Heat carefully and hold the boiling point \rightarrow otherwise the product will burn and become of black color
- Every 5 minutes the forming amount of water is determined and plotted in a coordinate system against time
- After the reaction has finished cool to room temperature and separate the reaction water from the water condenser
- Transfer remaining ester in a flask and stir for 20 minutes. During this time add drop wise 150 mL sodium carbonate-solution (w=10%) \rightarrow Stir until the forming of gas has stopped
- Transfer the mixture in a separating funnel to isolate the aqueous phase which can be disposed of in the sink
- Dry the organic phase for 30 minutes over 10 g sodium sulphate
- Decant the ester in a previously tared beaker glass and determine the yield

Waste disposal

- The separated watery phase can be disposed of in the sink
- Dispose of the organic phase in the container for non-halogenic solutions

Analysis:

- Calculation of the yield of acetic acid butyl ester in grammes and percentage of theory regarding the charging stock of butan-1-ol
- Show the forming of water in a graphic diagramm (coordinate system)
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Preparation list

Chemicals:

- | | |
|------------------------|---------|
| • Glacial acetic acid | 57.2 mL |
| • Butan-1-ol | 73.2 mL |
| • Sulfuric acid, conc. | 1.0 mL |
| • Sodium carbonate | 15.0 g |
| • Sodium sulfate | 10 g |
| • Water, dest. | |

Material:

- 500 mL multipile neck flask
- Separating funnel incl rubber plug
- Beaker glasses
- Liquid funnel
- Measuring cyclinder (2x 100 mL)
- Pipette with pipetting aid
- Heating plate with magnetic stirrer
- Mixing blade
- Water separator
- Safety gloves
- Reflux condenser with tubes
- Support stand
- Clamps and sockets