Preparation of 2-chloro-2-methylbutane

The reaction is SN1. The overall reaction is:

\[
\text{CH}_3 \text{CH}_3 \text{C CH}_2\text{OH} + \text{HCl} \leftrightarrow \text{CH}_3 \text{CH}_3 \text{C CH}_2\text{Cl}
\]

WEAR GLOVES

Procedure

Take your 125 mL separatory funnel and 100 mL graduated cylinder to hood #1. Place 10mL of 2-methyl-2-butanol and 25mL of concentrated (12M) HCl.

Swirl the contents of the separatory funnel gently, without the stopper in the funnel.

After swirling for about 1 minute, stopper and invert the funnel.

After inverting, vent to release excess pressure by carefully opening the stopcock.

Shake, and vent the funnel intermittently for about 5 minutes.

Allow the contents of the funnel to stand until the mixture has separated into two distinct layers. If two layers do not separate, consult your instructor.

Separate the layers and pour the aqueous layer into a 500-mL Erlenmeyer flask.

Wash the organic layer with 10mL of water.

Allow the contents of the funnel to stand until two distinct layers form. Again, if two layers do not form, consult your instructor.

Separate the layers and add the aqueous layer to your 500-mL Erlenmeyer flask.

Place the organic layer into your separatory funnel, and add to it 10mL of 5% sodium bicarbonate.

Swirl the contents of the separatory funnel gently, without the stopper in the funnel. After swirling for about 1 minute, stopper and invert the funnel.

After inverting, vent to release excess pressure by carefully opening the stopcock.

Shake, and vent the funnel intermittently for about 5 minutes.

Allow the contents of the funnel to stand until the mixture has separated into two
distinct layers. If two layers do not separate, consult your instructor.

Separate the layers and add the aqueous layer to your 500-mL Erlenmeyer flask.

Wash the organic layer with 10mL of H₂O.

Allow the contents of the funnel to stand until the mixture has separated into two distinct layers. If two layers do not separate, consult your instructor.

Separate the layers and add the aqueous layer to your 500-mL Erlenmeyer flask.

Transfer the organic layer to a 50-mL Erlenmeyer flask and add 1gm. anhydrous CaCl₂.

Swirl the flask, intermittently for 15 minutes.

Transfer your product to a tared sample bottle, appropriately labeled. Save this product in your drawer for the alkyl halide tests.

Turn in your product and lab reports for synthesis of 2-chloro-2-methylbutane and alkyl halide classification tests upon completion of the alkyl halide tests.

**Notes**

Steps 1-2: The reaction, including mechanism is:

Steps 3-4: Venting is necessary because HCl has a high vapor pressure.

Step 8: The washing with water is to remove any excess HCl.
Step 9: The washing with NaHCO₃ is to neutralize the acid that is still present, (i.e. HCl + NaHCO₃ → NaCl + H₂CO₃), which immediately disintegrates to CO₂ and water. Because CO₂ gas is produced, venting is necessary.

Step 10: Water simply washes away the HCl and NaHCO₃ that is still present.

Che 317  Sp’2005

Lab Report

**Title:** Synthesis of 2-Chloro-2-methylbutane

**Name:**

**Date:**

**Equation:**

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<tr>
<th>Table of Physical Constants</th>
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<tr>
<td><strong>Compound</strong></td>
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<td>HCl</td>
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<td>(CH₃)₂C(Cl)CH₂CH₃</td>
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**Results:** Calculate the % yield for 2-chloro-2-methylbutane

Boiling range for your product _________ to _________ °C