

Deceptive Labeling of Painkillers

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Summary

The lack of labeling for inactive ingredients in pharmaceuticals is both dangerous and deceptive. This study uses melting and boiling point analysis to determine the purity of over-the-counter painkillers with active ingredients of aspirin, ibuprofen, and acetaminophen. The results show obvious impurities in the medications, with melting points aligning with expected values but boiling points deviating significantly. Ibuprofen had no discernible boiling point and visual data showed impurities with color change and leftover solutes. These impurities can cause significant allergic reactions among other medical issues.

Introduction

Glancing at the back of a pill bottle, one notices that pharmaceuticals are only required to list their active ingredients. This raises the question: what are we putting in our bodies whenever we take painkillers? This study uses melting and boiling point analysis to determine the purity of common over-the-counter painkillers with active ingredients of aspirin, ibuprofen, and acetaminophen. Additionally, physical contaminants not melted or boiled can be seen clearly in the 2mm capillary tubes. These impurities can cause significant allergic reactions among other medical issues.

Hypothesis

The painkillers will have trace amounts of undisclosed inactive ingredients.

Purpose

Ensuring the efficacy and safety of over-the-counter pain medications.

Materials

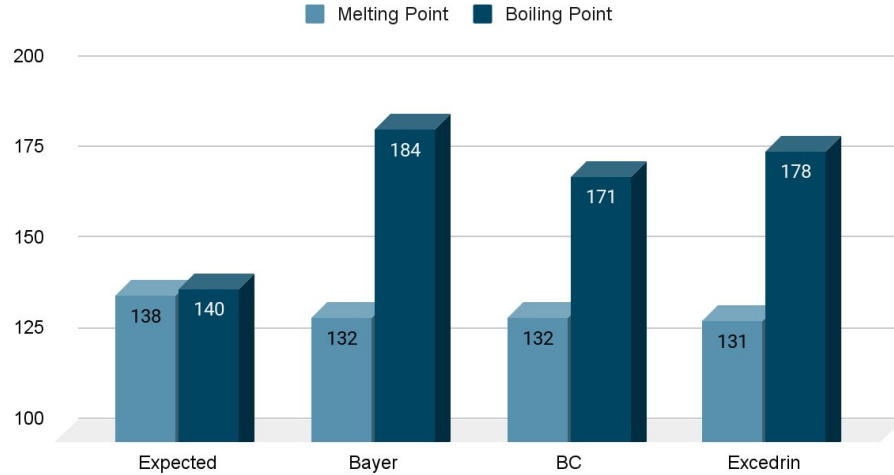
- Mortar & Pestle
- Metal Spatula
- 2mm capillary tubes
- Vernier Melt Station
- Various Painkillers

Procedure

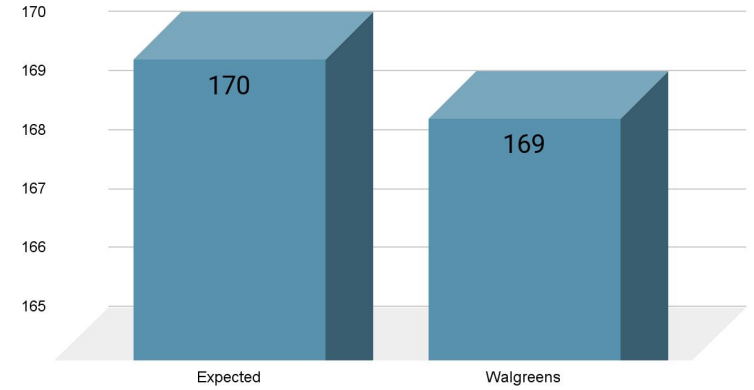
1. Take 1 pill and grind into a fine powder using mortar and pestle
2. Fill 2mm capillary tube with metal spatula to sufficient amount for visual analysis
3. Utilize Vernier Melt Station™ to slowly heat the capillary tube
4. Take note of melting and boiling point for analysis
5. Repeat twice for statistical conformation
6. Repeat steps 1-5 for the other medications

Data

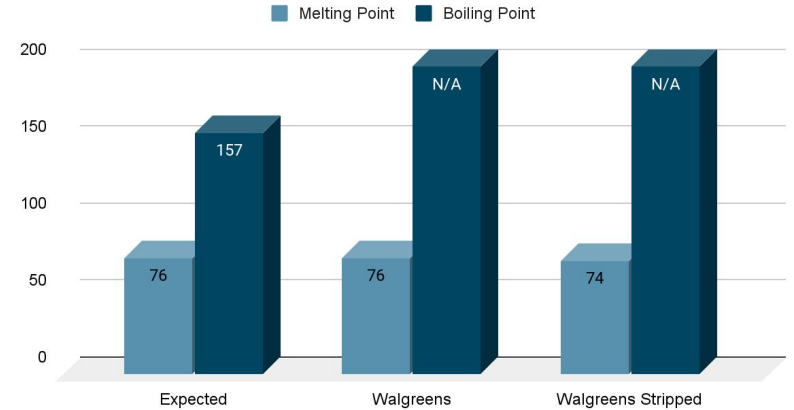
Aspirin Melting and Boiling Points

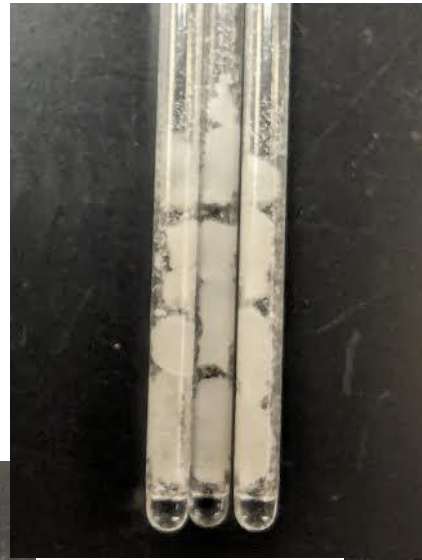
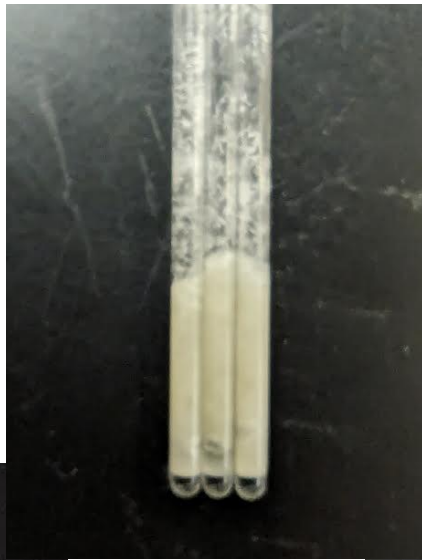


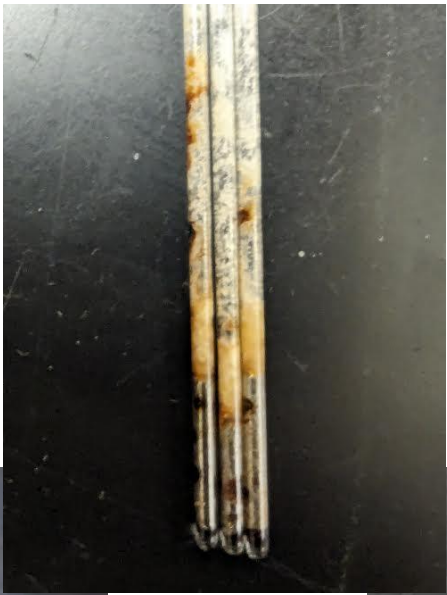
Acetaminophen Melting Point



Ibuprofen Melting and Boiling Points







Conclusion

The use of active ingredient in labeling is both dangerous and deceptive. The data shows that there are obvious impurities in the medications. The melting points of all three substances aligned closely with expected values; however, the boiling points deviated significantly. The ibuprofen had no discernible boiling point: there was no state change when heating beyond its boiling point. Furthermore, the visual data proved to have troublesome results. Impurities with color change and leftover solutes were present.

Future Work

For further study thin-layer chromatography could be conducted on the ground pills in a dichloromethane or acetone solution.

Additionally a wider array of samples and experiments would lessen statistical error.

References

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