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## Supplemental Materials

for

### Using Soxhlet Ethanol Extraction to Produce and Test Plant Material (Essential Oils) for Their Antimicrobial Properties

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## Appendix 1: Potential modifications to the activity.

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The activity can be modified to meet your curricula requirements. It can range from a standard extraction of one plant and testing for antimicrobial activity, to a larger investigative project that can look at a range of variables. If enough plant materials are tested against microorganisms, then this would provide substantial data for students to complete a comprehensive analysis for efficacy of antimicrobial compounds. Variables include:

- Comparisons between fresh and dried herbs. Dried thyme is easier to handle because it does not leak any liquid, is cheaper and can be stored for future use. Fresh thyme provided a greater yield.
- Comparison between crushed and non-crushed herbs.
- Comparison of antimicrobial effect between direct and vapor contact (1).
- Comparison between different plants known to have antimicrobial actions (e.g. eucalyptus, peppermint and lavender).
- Testing the student's own extract against an essential oil purchased from a supplier (for example an oil tincture used for aromatherapy). Dilutions of the commercially available oil (in a carrier oil such as grapeseed oil) can be tested against Soxhlet extract as an assay.
- Gas chromatography can also be used to identify what molecules are present in the extract (2).

## REFERENCES

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2. **Hawthorne, S. B., M. S. Krieger, and D. J. Miller.** 1988. Analysis of flavor and fragrance compounds using supercritical fluid extraction coupled with gas chromatography. *Analytical Chem.* **60(5)**:472–477.