The effects of Xylene on the environment make it harmful and substituting an alternative substance for sustainability

By: Simran Manasiya

Karina Sandoval, Maya Martinez, Jasmine Rodriquez, Esmeralda DeLeon

Abstract

A common solvent in many sectors is the colorless, flammable liquid xylene. However, worries regarding its effects on the environment have been raised by its extensive use. During its manufacturing, usage, and disposal, xylene can leak into the air, water, and soil, having detrimental effects on both human health and the environment. Xylene can help create ground-level ozone in the atmosphere, a dangerous pollutant that can impair breathing. Xylene can harm aquatic life and contaminate aquatic habitats when it is present in water. Xylene can build up and linger in the soil for a very long time, potentially affecting soil quality and plant growth. Overall, xylene is a dangerous material that needs strict management and regulation because of its impact on the environment. The slides were treated with cedarwood oil, washed in deionized water, and stained with hematoxylin before being rapidly dipped 8-12 times in ethanol at 70 degrees Celsius.

Introduction

In several sectors, xylene is a common solvent. However, because of its tendency to seep into the air, water, and soil during its production, usage, and disposal, concerns have been raised over its influence on the environment and human health. Concerns about the negative consequences of xylene on both human health and the environment led to the study's execution. Although xylene is a solvent that is frequently used in many different industries, it has the potential to produce ground-level ozone, which can cause respiratory issues. To prepare slides for staining, a different approach was investigated utilizing cedarwood oil. The study's objectives included examining unidentified patient samples to look for any abnormalities or diseases and investigating the use of cedarwood oil as a possible substitute for xylene in slide preparation and staining. No precise

predictions or hypotheses were made in the study. However, it was anticipated that utilizing cedarwood oil would produce staining results that were equivalent to or better than those obtained with xylene while also reducing the possible negative consequences of xylene on both human health and the environment. The slides were first treated with cedarwood oil, washed in ethanol, stained with hematoxylin, stained with eosin, dehydrated, then stained with acid ethanol. The Permount (xylene-based) material was then applied to the slides. The samples underwent a thorough analysis and inspection to find any anomalies or disorders. The study aimed to investigate Cedarwood Oil's potential as a xylene substitute in slide preparation and staining. The study may reveal anomalies or diseases in the samples it examines, and it may also show that Cedarwood Oil has the potential as a safer substitute for xylene in slide preparation and staining. The results can also inspire additional research and development of xylene substitutes in many industries.

Table 1.1. A pilot experiment was conducted to determine which oil functions works best as a clearing agent, deparaffinized, or both.

Deparaffinizing Agent	Clearing Agent
Xylene	Xylene
Cedarwood/Sunflower Oil	Xylene
Cedarwood/Sunflower Oil	Cedarwood/Sunflower Oil
Xylene	Cedarwood/Sunflower Oil

Methods

The following techniques were used to get the slides ready for staining. First, the slides were prepared with cedarwood oil. At a starting temperature of 70 degrees Celsius, three 3'cedarwood oil applications were employed. Extra cedarwood oil was blotted before being dipped into ethanol. Before plunging the slide into the ethanol, a washing step using 10% soap in every liter of water was added to get rid of any extra oil. The slides were then washed in 1 x 5' deionized water after being immersed in 100% ethanol for 1 minute, three times.

These techniques were employed with the goal of preparing slides for staining while reducing the potential health and environmental risks of employing xylene. The method entailed precise washing and staining procedures and used cedarwood oil as a substitute for xylene. This technique may result in a decrease in harmful environmental effects, an increase in laboratory staff safety, and reliable results for the analysis of patient samples.

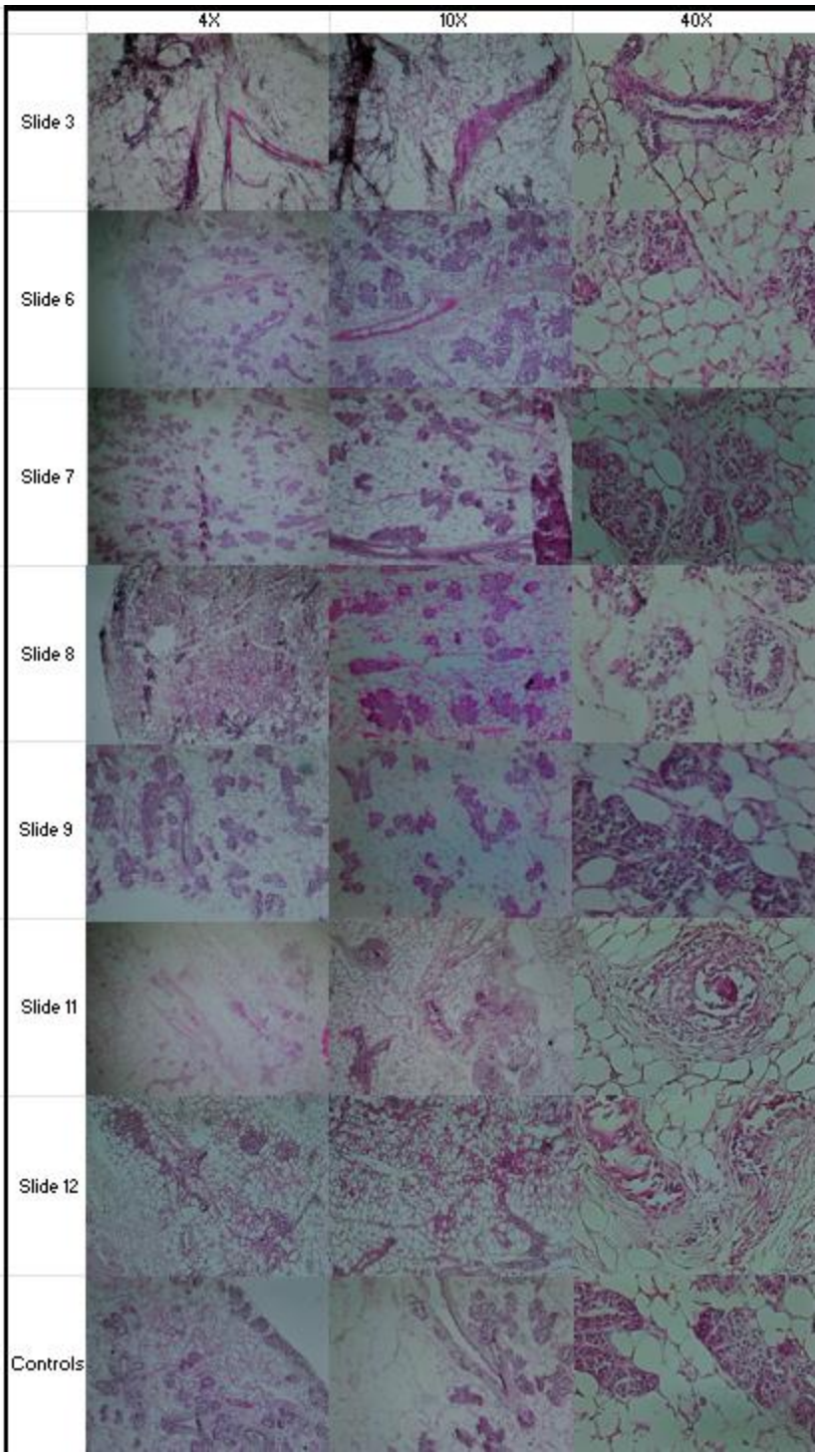
Table 1.2. The pilot experiment revealed that Xylene performed best as a clearing agent,
whereas Cedarwood Oil performed best as a deparaffinized agent.

Deparaffinizing Agent	Clearing Agent
Xylene	Xylene
Cedarwood Oil	Xylene
Cedarwood Oil	Xylene
Cedarwood Oil	Cedarwood Oil

Results

Success was achieved in the slide preparation and staining process utilizing cedarwood oil instead of xylene. There were no problems or difficulties during the staining process that could be seen. The technique successfully prepared the slides for the investigation of unidentified patient samples. The pH sensitivity of the hematoxylin staining allowed for the effective production of precise and transparent findings. The slides were cleaned and allowed to dry overnight before being rinsed with tap and deionized water to let the stain develop.

Figure 1.1. Cedarwood oil was used as a substitute for xylene in slide preparation and staining, with no errors or issues, therefore, it can be a useful substitute for xylene.


4X
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Slide 12
Controls

Discussion

It is a noteworthy achievement that cedarwood oil was used to successfully prepare slides for staining instead of xylene. Additionally, the substitution of cedarwood oil did not cause any issues throughout the staining procedure, proving that cedarwood oil might be a good substitute for xylene. Hematoxylin staining was used to prepare the slides, allowing for precise and clear results. Hematoxylin staining is sensitive to pH, and the technique makes use of this sensitivity to deliver successful results. The pH sensitivity guarantees precise and targeted staining, resulting in high-quality results with greater levels of detail. After cleaning and overnight drying, the slides were rinsed with tap and deionized water. The staining can be properly developed with the help of the overnight drying procedure, which can result in more exact and accurate outcomes. The slides should be rinsed with tap and deionized water to get rid of any remaining stains and prevent any distortion of the results.

Finally, the successful use of cedarwood oil in place of xylene for the preparation and staining of histology slides offers scientists an alternative and effective choice. By using this method, expenses may be decreased, and lab safety can be increased. Hematoxylin staining's sensitivity to pH provided a high level of detail while enabling accurate and transparent findings.

References

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