WHITEPAPER

Xylene and Its Alternatives

BIOCARE MEDICAL

Xylene and Its Alternatives

Tissue processing in histology involves fixation, dehydration, clearing, and infiltration.[3] Clearing is an essential pre-analytic step in histopathology that makes it possible to embed tissue for proper sectioning.[2] Despite its documented health hazards, xylene is still one of the most popular clearing agents.[3]

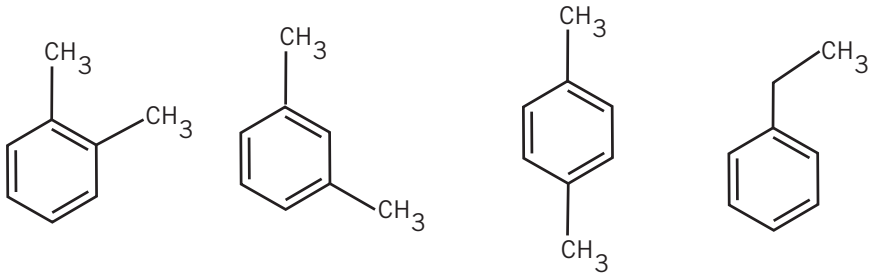
Tissue contains water that prevents infusion with embedding media such as paraffin, so dehydration with alcohol or other dehydrating agents is required to replace the water. A clearing agent is then needed to replace the dehydrant with a reagent that will be miscible with the embedding media. These clearing agents are often the most noxious reagents in the lab. Traditional clearing agents include chloroform, benzene, xylene, toluene, limonene, carbon tetrachloride, and natural oils such as citrus oil or cedarwood oil.[3] Xylene is among the most popular clearing agents due to its excellent compatibility with both alcohol and paraffin.[2]

However, the US Occupational Safety and Health Administration (OSHA) has identified xylene as a biohazardous chemical.[4] Fortunately, Xylene is not known to be mutagenic or carcinogenic.[1] Due to Xylene's volatility, it evaporates quickly and so does not pose a hazard to the food web.[1] However, it poses a significant risk of exposure by inhalation.[1] Inhalation can irritate the nose, throat, and lungs, causing chest pain and shortness of breath. Dizziness, headache, nausea, and vomiting may follow, and long-term exposure can lead to insomnia, tremors, impaired concentration, and short-term memory loss.[4] Animal studies have demonstrated that excessive xylene exposure is toxic to the tissues of the nervous system, liver, skin, and lungs.[2]

Laboratory technicians may be exposed to xylene during tissue processing, deparaffinization, cover-slipping, reagent recycling, and equipment cleaning. Given the number of avenues for exposure, the need for safer, non-toxic substitutes is apparent.

Biocare Medical Aqua DePar is a water-soluble deparaffinization reagent that can be used for immunohistochemistry (IHC), H&E staining, and special stains. This product eliminates the use of xylenes and so diminishes the risk of hazardous reagent exposure and reduces toxic waste production while maintaining staining quality. In development, hundreds of tissues and several different kinds of paraffin were tested for H&E's, special stains, and IHC. When directly compared to traditional xylene methods, no differences with Aqua DePar were noted.

Xylene and Its Alternatives Symbols



o-xylene *m*-xylene *p*-xylene ethylbenzene

Laboratory-grade xylene generally consists of m-xylene (40–65%), p-xylene (20%), o-xylene (20%) and ethyl benzene (6-20%) with other trace chemicals.[2]

Xylene is flammable, a known irritant, and health hazard[4]

To learn more about Aqua DePar as a xylene alternative for your lab, biocare.net or call 1-800-799-9499 to consult our technical support line.

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3. Metgud, R., Astekar, M. S., Soni, A., Naik, S., & Vanishree, M. (2013). Conventional xylene and xylene-free methods for routine histopathological preparation of tissue sections. Biotechnic & histochemistry : official publication of the Biological Stain Commission, 88(5), 235–241. https://doi.org/10.3109/10520295.2013.764015
4. Prema, V., Prasad, H., Srichinthu, K. K., Kumar, S. S., Rajkumar, K., & Marudhamani, C. (2020). Biofriendly Substitutes for Xylene in Deparaffinization. Journal of pharmacy & bioallied sciences, 12(Suppl 1), S623–S630. https://doi.org/10.4103/jpbs.JPBS_164_20