

Xylene spillage in medical laboratory: A case study

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The term "xylenes" refers to a group of 3 benzene derivatives which encompasses ortho-, meta-, and para- isomers of dimethyl benzene. In this article, the author reports an incident of xylene spillage in a medical laboratory. The author also discusses the basic toxicology of xylene, health effect and monitoring as well as management of xylene waste.

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ไซลีนเป็นสารอนุพันธ์ของเบนซีนชนิดหนึ่ง ในบทความนี้ผู้นิพนธ์ได้นำเสนอกรณีศึกษาเรื่องการหกล้มของไซลีนในห้องปฏิบัติการแห่งหนึ่ง ผู้นิพนธ์ได้นำเสนอความรู้พื้นฐานเกี่ยวกับการเกิดพิษจากไซลีน ผลต่อสุขภาพ การตรวจวัดเฝ้าระวัง และการกำจัดไซลีน

คำสำคัญ : ไซลีน, ห้องปฏิบัติการ

The term “xylene” refers to a group of 3 benzene derivatives which encompasses *ortho*-, *meta*-, and *para*- isomers of dimethyl benzene.⁽¹⁾ The *o*-, *m*- and *p*- isomers are specified the carbon atoms (of the main benzene ring) to which the two methyl groups are attached.⁽¹⁾ The chemical is a colorless, sweet-smelling liquid which is highly flammable.⁽¹⁾ It occurs naturally in petroleum and coal tar and is formed during forest fires.⁽¹⁾ Xylene is also used in medical laboratories especially those concerning cytology and histology.⁽²⁾ Although xylene does not have medical/health surveillance requirements as set by the Occupational Safety and Health Administration (OSHA) as the standard given for formaldehyde, medical evaluation of employees who are exposed to xylene above the critical level is effective occupational and environmental health practice.⁽²⁾ Pros and cons of xylene in medical laboratory are listed in Table 1.

In this article, the author reports an incident of xylene spillage in a medical laboratory, and discusses the basic toxicology of xylene, health effect and monitoring as well as management of xylene waste.

Case Report

One morning, an accident of xylene spillage occurred in a medical laboratory. The bottle of xylene accidentally fell from the shelf onto the floor. The

spillage of liquid xylene occurred and caused a sharp smell all around the laboratory. All laboratory workers could detected this smell and found masks to cover their noses. The management of the xylene waste was rapidly done via mopping with tissues, and the waste was disposed into the chemical specific bin. All doors in the laboratory were open to release the xylene smell inside the laboratory. The worker who mopped the floor felt nausea and vomiting after completing the cleansing. The other medical workers in the laboratory also reported similar symptoms. However, there was no specific case presented with severe irritation. The symptoms of all workers disappeared within one day after this accident.

Discussion

Xylenes, or dimethylbenzenes, are among the highest-volume chemicals in production. Common uses are for gasoline blending, as a solvent or component in a wide variety of products from paints to printing ink, and in the production of phthalates and polyester.⁽³⁾ Xylene is also widely used in medical laboratory. As part of its mandate, the Agency for Toxic Substances and Disease Registry (ATSDR) prepares toxicological profiles on hazardous chemicals found at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) sites that are of greatest concern

Table 1. Pros and cons of xylene in medical laboratory.

Pros	Cons
1. Cleaning after per mounting glass slide	1. Bad smell
2. Cleaning of lens of microscopy	2. Irritation
	3. Neurotoxicity
	4. Possible carcinogenicity

Table 2. Basic toxicology of xylene.

Items	Details
1. Half life	About 3 hours
2. Route of absorption	Skin contact (slow), respiration (rapid), ingestion (rapid)
3. Acute toxicity	Symptoms of acute poisoning include CNS effects (headache, dizziness, ataxia, drowsiness, excitement, tremor, and coma), ventricular arrhythmias, acute pulmonary edema, respiratory depression, nausea, vomiting, and reversible hepatic impairment.
4. Chronic toxicity	Chronic exposure can bring anemia, thrombocytopenia, leukopenia, chest pain with ECG abnormalities, dyspnea and cyanosis as well as CNS symptoms.

for public health purposes.⁽³⁾ Exposure of people to high levels of xylene for a short period can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys.^(1,3) A summary on the basic toxicology of xylene is shown in Table 2. In occupational medicine, monitoring of exposure by urine methyl hippuric acid test is recommended.⁽⁴⁾ As for the environmental control of xylene, the emission rates for xylene should also be considered for the calculation of spatial downwind concentrations from area sources. This can be used for risk assessment in order to determine the maximum carcinogenic risk amongst the population.⁽⁵⁾

Spillage of xylene in a working site can be considered a serious accident. In medical laboratory, this episode is not as common as a spillage of blood and body fluids but it is important. Since many medical laboratory workers lack for the experience in chemical management the improper management can be expected. Some workers may use alcohol to cover xylene, as routine practice for blood, but this can

cause fire if there is any spark. Some workers might use tissue paper to directly swap the spilled xylene on the floor but this can bring irritation to the corresponding workers. The proper management in this case is using soil to cover.^(1,3) For waste management of xylene in medical laboratory, recycling xylene saves money and the environment.^(6,7)

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