

Reducing Chemical Waste through Distillation

By: Ray Ronda

Alexian Brothers Medical Center is a licensed, 460-bed facility with approximately 2,500 employees located in the Chicago suburb of Elk Grove Village. Hospital officials were interested in recycling ethanol and xylene laboratory waste solvents. They hoped to:

- Reduce or eliminate disposal cost.
- Reduce cost and usage of new chemicals.
- Control inventory in the laboratory.

The Histology laboratory uses both alcohol and xylene in the process of pathological slide preparation for tissue analysis. The tissue is first treated with alcohol to remove any moisture. The alcohol is then removed with xylene in preparation for the application of paraffin, which provides a stable medium for cross sectioning. After the slide staining process xylene is also used to remove the residual paraffin. Prior to the installation of the solvent still, the hospital was buying 350 gallons of ethanol and 275 gallons of xylene per year.

In 1995, Angela Baker, Cytology Technician, suggested that the lab staff look into the benefits of distilling their used alcohol and xylene on-site instead of disposal and purchase of new solvent every week. Investigation indicated that they could purchase one distillation unit that was capable of processing both chemicals with only a control unit program input change. The product that remains after the distillation is put into plastic bottles that are disposed of in the red bag waste.

The key to the successful implementation of this waste minimization project appears to be that the laboratory personnel have taken complete ownership of the process. They transport the used chemicals to the still, start the process, and remove the distillate when complete. The distillation process requires little maintenance at this facility. The laboratory personnel feel that the quality of the distilled xylene is higher and more consistent than what they had been purchasing.



Kate Abozoglai in the Laboratory with the alcohol and xylene containers in tissue processor.

At the present time the still runs three cycles per day. One run of four to six gallons of xylene taking approximately four hours to distill, and two runs of four to six gallons of alcohol taking six to eight hours to distill. When the distillation process is complete, the alcohol is 95 % pure, and the xylene is actually a higher quality than the product they purchase.

Now they only purchase 100% ethanol, since the 95% used in the staining process is completely supplied by the still.



Tom Johnson with the solvent still.

Financial Impact

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| Cost/year of disposal prior to still: | | Cost/year of solvents prior to still: |
| Alcohol | \$ 1,050 | \$ 1,313 |
| Xylene | \$ 825 | \$ 6,325 |

Total Cost/year Prior to Distillation: \$9,513

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| Cost of Still: | \$15,000 | Cost/year of operating | \$871 |
| Cost/yr of disposal after still: | | Cost/yr of solvents after still | |
| 100% Alcohol | \$56 | \$ 375 | |
| Xylene | \$44 | \$ 1,840 | |

Total Cost/year with Distillation: \$3,185

Payback Time: 2 1/3 years.

This case study was conducted at **Alexian Brothers Medical Center**, 800 Biesterfield Road / Elk Grove Village, IL 60007. Special thanks go out to Mr. Tom Johnson (Facilities Director) and the entire Histology and Pathology Laboratories.

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