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XYZ ADHESIVE EXPOSURE SURVEY

Dear Client:

Please find below the results of the airborne worker exposure survey performed at ABC Inc. located at 1 Second Street, Winnipeg on December 17, 2019. Air testing was performed to evaluate the airborne exposure of a worker spraying XYZ adhesive.

Background

In Cell 1A, a worker is spraying XYZ adhesive. The Safety Data Sheet (SDS) for the adhesive reports the product to contain acetone, n-hexane, and toluene (Appendix A). These solvents have significant vapour hazard ratios (VHRs) that indicate the potential for the adhesive to have airborne levels near or above the acceptable airborne levels.

The WATSIN exposure model was used to predict worker exposure by entering information on the product and it is used into a computer program. The results from the exposure modelling can be found below. The model predicts worker exposure to be between 100% and 200% of the Occupational Exposure Limit (OEL).

In light of the exposure modelling, air testing was performed to evaluate worker exposure for n-hexane, acetone, and toluene while spraying XYZ adhesive in Cell 1A.

Methodology

A personal sample was collected by having the worker wear a passive sampling badge clipped to the front of their shirt positioned in order to collect air from their breathing zone. The sample was analyzed at an AIHA-accredited laboratory using Analytical Method AT L-OV (GC/FID) for acetone, n-hexane, and toluene.

Allowable Exposure Limits

The results of the airborne solvents were compared to the 2019 Threshold Limit Values (TLVs). TLVs represent time-weighted average airborne concentrations to which it is believed that a worker can be exposed, 8 hours per day, 40 hours per week, without adverse effect. TLVs have been adopted in the Safety and Health legislation as the allowable exposure guidelines in Manitoba.

Results

The solvent results can be found in the table below. The results are presented as a percentage of the TLV; that is as a percentage of the allowable level. A copy of the laboratory results has been appended (Appendix B).

Where two or more chemicals produce the same effect on the body or act on the same target organ, their exposures should be considered as additive. That is to say that their respective fraction of their individual TLVs should be added. A summary of the health effects of the solvents sampled can be found below:

- acetone – upper respiratory tract (URT) and eye irritation, central nervous system (CNS) impairment
- n-hexane – CNS impairment, peripheral neuropathy, eye irritation
- toluene – visual impairment, female reproduction effects, pregnancy loss

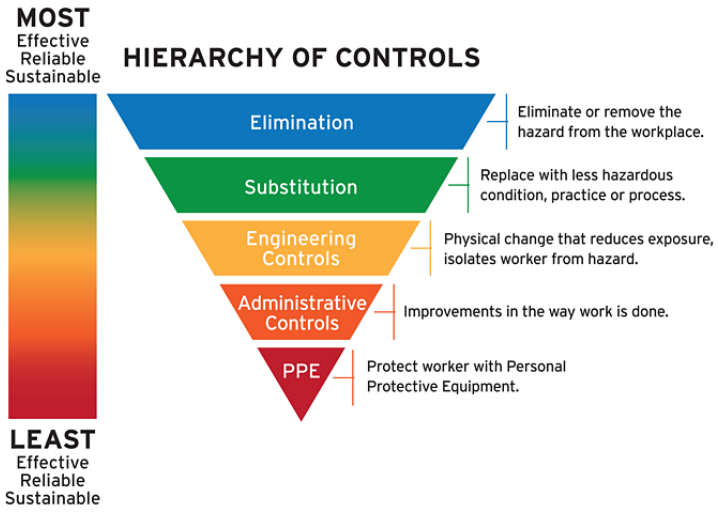
Acetone and n-hexane both cause eye irritation and impairment to the CNS (Central Nervous System) so they would be considered additive.

XYZ Adhesive Sampling Results

Work Area/Worker	Acetone	n-Hexane	Toluene
Cell 1A – Worker 1	44 ppm	30 ppm	34 ppm
2019 TLV	**250 ppm**	**50 ppm**	**20 ppm**

Discussion

The worker's exposure to toluene was above the TLV on the day of sampling. Additional controls are needed to reduce worker exposure while spraying XYZ adhesive. In general, the introduction of controls should follow a control hierarchy where the most effective controls are considered first and the least desirable controls considered last. A diagram of a control hierarchy is provided below.



The spraying operation is going to be moved to a new area of the plant. Consideration should be given to controls in this area as part of moving the process. This could include a backdraft booth or other controls. Engineering controls often provide the best long-term protection and would protect any other workers who are nearby. In light of the magnitude of the exposure, it is recommended that respiratory protection be introduced as an interim measure to reduce worker exposure until more permanent solutions can be explored. Half-face respirators with organic vapour cartridges would provide adequate protection based on the sampling results.

Conclusion

Worker exposure to solvents in the XYZ adhesive was above the OEL. Additional controls are needed to reduce worker exposure while performing this activity and should be considered as part of moving the process to a new area of the facility.

I hope this is information is of assistance to you. Should you have any questions, or if we can be of any further assistance, please contact me at (204) 668-3141.

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Appendix A – Information from Safety Data Sheet

Section 1. Identification

Product identifier

Other means of identification

Recommended use and restrictions on use

Initial supplier identifier

[redacted]

Emergency telephone number/restriction on

Section 3. Composition/information on ingredients

Chemical name (common name/synonyms)	CAS number or other	Concentration (%)*
n-Hexane	110-54-3	30-50
Acetone	67-64-1	20-40
Toluene	108-88-3	10-30

* Statement - This safety data sheet provides concentration range(s) instead of the actual concentration(s) considered trade secret(s).

Appendix B – Copy of Laboratory Results of Air Testing

Lab Sample ID	Lab Code	Date Sampled	Client Sample ID	Media	Media Lot / Serial #	Analytes Requested	Quantity Found Total	RptLmt	Units	Sample Vol. (L)	Time (min)	Concentration Found	Units
19047712	ATOH	12/17/2019	[redacted]	546C	4A18 - NB0623								
						ACETONE	131	2.0	UG	1.26	390	44	PPM
						n-HEXANE	103	0.60	UG	0.964	390	30	PPM
						TOLUENE	117	2.0	UG	0.924	390	34	PPM

Analyzed By: MWAGNER Analyzed On: 12/20/2019 Approved By: KTAYLOR Approved On: 12/20/2019