

Composition and Content of Thinner Sold in Busan and Gyeongnam Area and Reliability of MSDS

Kwon Chul Ha, Yu Young Kim, Seung Hyuk Yang, Jung Sil Lee,
Hyoung Sook Lee, Kong Hwa Jang, Koo Won Jin

Changwon National University, 9 Sarim-Dong, Changwon, Gyeongnam, 641-773, Korea

Objectives

This study was conducted, to identify ingredients of thinners and to evaluate reliability of material safety data sheets (MSDS) of thinners for workers' health.

Methods

The 41 thinner products were collected from paint shops located in Pusan and Gyeongnam area. The 12 thinner products among them were identified using product material safety data sheets (MSDS). GC-MSD was used to analyze 41 kinds of thinners qualitatively and quantitatively. The 12 products MSDS were compared with thinner's component through qualitative analysis to identify reliability of MSDS. Chemical component contents (such as Benzene, Toluene, and Xylene *etc.*) were calculated through quantitative analysis.

Results and Discussion

The 41 thinner products contained 17 disclosed specific, trade name, or generically described chemical solvent ingredients. These 17 ingredients came under 6 classes: alcohols, aromatic hydrocarbons, esters, glycol ethers, ketones, and mixtures. These 17 ingredients were important in the view of industrial hygiene and had occupational exposure limit in the ambient, such as toluene, xylene, acetone, nonane, EGEE, heptane, cumene, MIBK, indene, tri-methyl benzene, *etc.*, were found in 41 kinds of thinners (Table 1). Aromatic hydrocarbons was the most identified compound of thinners analyzed (Table 2). Especially, the benzene, which induces leukemia, was found in 4 kinds of thinners. The content rates of benzene in thinners were 0.25~1.18%. The benzene in enamel thinner, which were 0.39~0.72%, was highest from chemical classification. The contents of toluene, which was found from 27 kinds of thinners, were 5.35~64.16%, which were highest in sobu thinner as 58.80%. Xylene was found from 22 kinds of thinners and contents of xylene were 4.61~72.42%. Acrylic thinner's contents of xylene were 12.06~51.05%, which was most high. It was found that contents of benzene were increased and frequency of detection was decreased through comparison with other study (Table 3). The MSDS possession

rate of paint shops was low as 29.27%. So it did not provide information with public or workers. Mean of agreement rate between MSDS and components of thinners through qualitative analysis was 42.01% and it has wide range from 8.3% to 75%. There are many deficiencies in MSDS about component of thinners. In some case of sample, especially, despite containing benzene, information was not written it on MSDS.

Table 1. The number of collected thinners by Manufacturer

Manufacturer	Number of thinner
A	10
B	8
C	5
D	3
E	2
F	1
G	1
H	3
Others	8
Total	41

Table 2. Classification and chemical contents of thinners by type of organics

Type of Organics	This Study	Other Study (Nam Won Paik)	Other Study (Winder and Ng)
	Frequency(%)	Frequency(%)	Frequency(%)
Aromatic Hydrocarbons	39/41(95.1)	71/108(65.7)	11/20(55)
Ketones	19/41(46.3)	11/108(10.2)	14/20(70)
Glycol ether	18/41(43.9)	7/108(6.5)	4/20(20)
Esters	17/41(41.5)	5/108(4.6)	10/20(50)
Alkane	11/41(26.8)	14/108(13.0)	-

Table 3. Comparison of detected benzene content in thinner with other study

Detected Benzene	This study	Other study	
		Lee et al.(2003)	Paik et al.(1998)
Frequency(%)	4/41(9.8)	7/70(10.0)	8/108(7.4)
Content(%)	0.3~1.2	< 0.1	0.1~56.7

Conclusion

The presence of hazardous ingredients in thinner products continues. The proportion of ingredients can vary significantly, and the hazards may change accordingly. It needs for manufacturers and merchants of thinners to change their awareness about material which was contained in thinners and to reduce contents of hazardous components such as benzene. Educational programs should be developed to inform users that thinners are different materials made of different ingredients, and that they have different hazards that should be treated with

proper respect. The MSDS should be updated regularly to increase reliability of data and needed to control thoroughly by education.

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