เอกสารอ้างอิง

จรัส สุวรรณเวลา, จิตร สิทธิอมร และวิยัย โปษยะจินดา "ปัญหาการติดยาในประเทศไทย" รายงานการวิจัย สท 2/23 จุฬาลงกรณ์มหาวิทยาลัย: สถาบันวิจัยวิทยาศาสตร์การแพทย์, 2523.

วิยัย โปษยะจินดา "วิวัฒนาการปัญหายาเสพติดในประเทศไทย" รายงานการวิจัย สส 1/23 จุฬาลงกรณ์มหาวิทยาลัย : สถาบันวิจัยวิทยาศาสตร์การแพทย์, 2523.

Adamson, R.H., Bridges, J.W., Evans, M.E. and Willaims , R.T. "Species Differences in the Aromatization of Quinic Acid in vivo and the Role of Gut Bacteria " Biochemical Journal 116 (1970) :437-443.

Addiction Research Foundation. "Concerning Solvent and Aerosol Abuse " Information Review, Toronto, 1976.

Amsel, L.P. and Levy, G. "Drug Biotransformation Interactions in Mass II : A Pharmacokinetic Study of the Simultaneous Conjugation of Benzoic and Salicylic Acids with Glycine " Journal of Pharmacentical Sciences 58(3), (1969) : 321-326.

Anthony, R.M., et al. "Paraldehyde, Toluene, and Methylene Chloride Analysis by Headspace Gas Chromatography " Journal of Analytical Toxicology 2 (1978) : 262-264.

Arena, J.M. in Poisoning 7th ed., Charles C Thomas, Springfield, Illinois, 1979.

Bass, M. "Sudden Sniffing Death " The Journal of the American Medical Association 212(12), (1970) : 2075-2079.

Bassetle, R., Ozeris, S. and Whinah, C.H. "Gas Chromatographic Analysis of Head Space Gas of Dilute Aqueous Solutions " Analytical Chemistry 34 (1962) : 1540-1543.

Bien, G., Palys, E. and Wilezok, T. "TLC Separation of Hippuric, Mandelic, and Phenylglyoxylic Acids from Urine after Mixed Exposure to Toluene and Styrene " British Journal of Industrial Medicine 39 (1982) 187.

Bodel, P.T. Cotran, R. and Kass, E.H. "Cranberry Juice and the Antibacterial Action of Hippuric Acid " Journal of Laboratory and Clinical Medicine 54(6) (1959) : 881-888.

Browning, E. in Toxicity and Metabolism of Industrial Solvents Elsevier, London, 1965.

Chiou, W.L. and Niazi, S. "A Simple and Ultra Sensitive Head-Space Gas Chromatographic Method for the Assay of Fluorocarbon Propellants in Blood " Research Communications in Chemical Pathology and Pharmacology 6(2) (1973) : 481-498.

Cohen,S. "Glue Sniffing " The Journal of the American Medical Association 231 (1975) : 653-654.

Congpuong, P. "Analysis of Thinner in Biological Materials" Master's thesis, Department of Forensic Science, Faculty of Graduate Studies, Mahidol University, 1981.

Couri, D. Pharmacology and Toxicology in Review of Inhalants : Euphoria to Dysfunction, (Sharp, C. and Brehm, M. eds.) NIDA Research Monograph 15 p. 100. National Institute on Drug Abuse, Rockville, Md., 1977.

Department of National Health and Welfare. "Glue-Sniffing (Solvent Inhalation) " C.M. No. S-13, Food and Drug Directorate, Ottawa, 1969.

El Masry, A.M., Smith, J.N. and Williams, R.T. "Studies in Detoxication 69. The Metabolism of Alkylbenzenes : n-Propylbenzene and n-Butylbenzene with Further Observations on Ethylbenzene " Biochemical Journal 64 (1956) : 50-56.

Escobar, A. and Aruffo, C. "Chronic Thinner Intoxication : Clinico-pathology Report of a Human Case " Journal of Neurology, Neurosurgery, and Psychiatry 43 (1980) : 986-994.

Fairhall. L.T. in Industrial Toxicology, 2nd ed., pp. 343-345, Williams and Wilkins, Baltimore, 1957.

Fagan, D.G. and Forrest, J.B. "Sudden Sniffing Death " after Inhalation of Domestic Lipid-Acrosol " The Lancet (1977) : 361.

Foerster, E.H. and Garriott, J.C. "Analysis of Volatile Compounds in Biological Samples " Journal of Analytical Toxicology 5(1981): 241-244.

Gartzke, J. and Weigmenn, H.J. "A Simple Thin-Layer Chromatographic Method for the Estimation of Hippuric Acid : Comparison with a Photometric and a Gas Chromatographic Method " Journal of Chromatography 162 (1979) : 234-236.

Gerarde, H.W. in Tokicology and Biochemistry of Aromatic Hydrocarbon Elsevier, London, 1960.

Gerarde, H.W. in Industrial Hygiene and Toxicology (Patty, F.A. ed.) John Willey and Sons, New York, 1963.

Glaser, H.H. and Massengale, O.N. "Glue-Sniffing in Children Deliberate Inhalation of Vaporized Plastic Cements " The Journal of the American Medical Association 181(4) (1962) : 300-303.

Glendening, B.L. and Harvey, R.A. "A Simple Method Using Head-Space Gas for Determination of Blood Alcohol by Gas Chromatography" Journal of Forensic Sciences 14 (1969) : 136-145.

Grabski, D.A. "Toluene Sniffing Producing Cerebellar Degeneration " The American Journal of Psychiatry 118(1961) : 461-462.

Greenburg, L., et al. "The Effects of Exposure to Toluene in Industry " The Journal of the American Medical Association 118(8), (1942): 573-578.

Hansen, S.H. "Determination of Urinary Hippuric Acid and o-Cresol, as Indices of Toluene Exposure, by Liquid Chromatography on Dynamically Modified Silica " Journal of Chromatography 229 (1982) : 141-148.

Ikeda, M. and Ohtsuji, H. "Significance of Urinary Hippuric Acid Determination as an Index of Toluene Exposure " British Journal of Industrial Medicine 26 (1969) : 244-246.

Ikeda, M. 23. Mutual Suppression of Oxidation Involved in the Metabolism of Thinner Constituents in voluntary Inhalation of Industrial Solvents, (Sharp, C.W. and Carroll, L.T. eds.) pp. 322-332. National Institute on Drug Abuse, Rock ville, Maryland, 1978.

Jain, N.C. "Direct Blood-Injection Method for Gas Chromatographic Determination of Alcohols and Other Volatile Compounds " Clinical Chemistry 17(2), (1971) : 82-85.

Knox, J.W. and Nelson, J.R. "Permanent Encephalopathy from Toluene Inhalation " The New England Journal of Medicine 275(26), (1966) : 1494-1496.

Matsui, M., Kasao, M. and Imamura, S. "High-Performance Liquid Chromatographic Determination of Hippuric Acid in Human Urine " Journal of Chromatography 145(1978) : 231-236.

Means, E., Prockop, L. and Hooper, G. "Pathology of Lacquer Thinner Induced Neuropathy " Annals of Clinical and Laboratory Science 6(3), (1976) : 240-249.

Merry, J. and Zachariadis, N. "Addiction to Glue Sniffing " British Medical Journal 2 (1962) : 1448.

National Institute on Drug Abuse. "Inhalants ; The Deliberate Inhalation of Volatile Substances " NIDA Report Series 30, No.2, Rockville, Md, 1978.

National Information Service on Drug Abuse. " Technical Information Bulletin " No. 73, Commonwealth of Australia, Canberra, 1985.

Ogata, M., Tomokuri, K. and Takatsuka, Y. "Urinary Excretion of Hippuric Acid and m-or p-Methylhippuric Acid in the Urine of Persons Exposed to Vapours of Toluene and m-or p-Xylene as a test of Exposure " British Journal of Industrial Medicine 27 (1970): 43-50.

Parke, D. in The Biochemistry of Foreign Compounds Vol.V. Pergamon Press, Oxford, 1968.

Peterson, R.G. and Bruckner, J.V. "A Rapid Analytical Method for Measuring Toluene in Biological Specimens" Journal of Chromatography 152 (1978) : 69-78.

Press, E. and Done, A.K. "Solvent Sniffing " Pediatrics 39(1967): 451-461.

Quick, A.J. "The Conjugation of Benzoic Acid in Man " The Journal of Biological Chemistry 92(1), (1931) : 65-85.

Reisin, F., et al. "Myoglobinuria and Renal Failure in Toluene Poisoning " British Journal of Industrial Medicine 32 (1975): 163-168.

Sato, A. and Nakajima T. "Differences Following Skin or Inhalation Exposure in the Absorption and Excretion Kinetics of Trichloroethylene and Toluene " British Journal of Industrial Medicine 35 (1978) : 43-49.

Sato, A., Nakajima, T. and Fujiwara, Y. "Determination of Benzene and Toluene in Blood by Means of a Syringe. Equilibration Method Using a Small Amount of Blood " British Journal of Industrial Medicine 32 (1975) : 210-214.

Stewart, C.P. and Stolman, A. in Toxicology vol. I. Academic Press, New York, 1960.

Taylor, G.J. and Harris, W.S. "Cardiac Toxicity of Aerosol Propellants" The Journal of The American Medical Association 214 (1), (1970): 81-85.

The Chemical Formulary (Bennett, H. ed.) Vol. I.p. 231. Van Nostrand, New York, 1933.

The Merek Index , 9 th ed., (Windholz, M. ed.) p.1225. Merek & CO., Inc. Rahway, N.J., 1976.

Van Roosmalen, P.B. and Drummond, I. "Simultaneous Determination by Gas Chromatography of the Major Metabolites in Urine of Toluene, Xylenes and Styrene British Journal of Industrial Medicine, 35 (1978) : 56-60.

Williams., R.T. in Detoxication Mechanism John Wiley and Son, London, 1959.

Wilson, C.R.H. "Toluene Poisoning" The Journal of the American Medical Association 123(17) (1943) : 1106-1108.

Woiwode, W. and Drysch, K. "Experimental Exposure to Toluene : Further Consideration of Cresol Formation in Man " British Journal of Industrial Medicine 38 (1981) : 194-197.

Yoshida, Y., et al. "Gas and Liquid Chromatographic Determination of Urinary Hippuric Acid as an Index of Toluene Exposure " Bulletin of the Osaka Medical School 24(2), (1978) : 68-78.

ภาคผนวก

Lacquer thinner (The Chemical Formulary Vol.I, 1933)

Formula A.

Butyl acetate	20
Ethyl acetate	10
Denatured alcohol	10
Denatured alcohol	10
Toluol	60

Formula B.

Butyl acetate	25
Ethyl acetate	15
Butyl alcohol	10
Toluol	50

PRODUCTS INVOLVED IN SOLVENT SNIFFING AND THE CHIEF TOXIC CONSTITUENTS OF THESE PRODUCTS*

Plastic (styrene Cements)

Toluene**
Acetone
(Benzene)
Aliphatic acetates (ethyl acetate, methyl-cellosolve acetate, etc.)
Hexane
Cyclohexane

Model Cements

Acetone**
Toluene**
Naphtha (petroleum origin)

Household Cements

Toluene**
Acetone**
Isopropanol
Methyl ethyl ketone
Methyl Isobutyl ketone

Fingernail Polish Remover

Acetone**
Aliphatic acetates**
Benzene
Alcohol

Lacquer Thinners

Toluene**
Aliphatic acetates
Methyl, ethyl or propyl alcohol

Lighter Fluid Cleaning Fluid

Naphtha (petroleum origin)
Perchlorethylene
Trichlorethane
Carbon tetrachloride

Gasoline

*Non-volatile and substantially non-intoxicating constituents not listed.

**Principal intoxicants in various formulations.

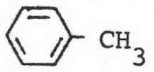
(Press and Done, 1967)

Table 1 Volatile substances used in commercial preparations

Compounds	Anti-freeze	Gaso-line	Paint Thin-ner	De-greas-ers	Wind-shield Wash-ers	Ad-hesives and Rubber Cement	Model Cement	Aero-sol Sprays	Spray Shoe Polish	Room Odor-ants	Foam Dis-pensers
Alcohols											
Methanol	X		X		X						
Ethanol			X				X	X			
Isopropanol	X		X	X			X	X	X		
Esters											
Ethyl acetate			X								
n-Propyl acetate			X								
n-Butyl acetate				X							
Ketones											
Acetone			X				X				
Methyl ethyl ketone			X	X							
Methyl butyl ketone			X								
Aromatic Hydrocarbons											
Benzene		X		X		X					
Toluene		X	X	X		X	X	X	X		
Xylene		X	X	X		X	X	X			
Stryene						X	X				
Naphthalene		X	X			X					
Aliphatic Hydrocarbons											
n-Hexane		X				X	X				
n-Heptane		X	X			X					
Anesthetics											
Methylene chloride			X	X							
Trichloroethylene				X							
Tetrachloro-ethylene				X							
Nitrous oxide											X
"Freons"								X			
Aliphatic Nitrite											
Isoamyl nitrite										X	

SOUCRE: D. Couri. Preclinical: Pharmacology and Toxicology. Introduction in *Review of Inhalants: Euphoria to Dysfunction.* C. Sharp and M.L. Brehm, eds. NIDA Research Monograph 15, October 1977, p.100.

Physical and Chemical Properties. (Gerarde,1963; The Merck Index,1976)

Synonyms.	: toluol, methylbenzene, methylbenzol, phenylmethane, methacide
Structure formula	: 
Molecular formula	: C_7H_8
Molecular weight	: 92.13
Physical state	: a colorless flammable refractive liquid with a characteristic benzene-like odor, burn with a smoky luminous flame
Boiling point	: 110.623°c
Melting point	: -94.991°c
Vapor density	: 3.2 (air = 1)
Vapor pressure	: 30 mm.Hg. at 26.04°c
Specific gravity	: 0.86220 at 25°c, 0.866 at 20°c
Refractive index	: 1.49405 at 25°c, 1.4967 at 20°c
Solubility	: miscible with alcohol, chloroform, ether, acetone, glacial acetic acid, carbon disulfide. Soluble in water 0.047 g./100 ml. at 16°c
Conversion factor	: 1 ml./liter = 266 ppm. and 1 ppm. = 3.76 mg./m^3. at 25°c, 760 mm.Hg.

ปริมาณโทลูอีนในซีรัมของคนปกติซึ่งวิเคราะห์ด้วยวิธีเฮดสเปซ แก๊สโครมาโตกราฟ

ตัวอย่างที่	เพศ	อายุ	ปริมาณโทลูอีน (ไมโครกรัม/มิลลิลิตรซีรัม)
1	F	24	non-detectable
2	M	25	"
3	M	25	"
4	M	25	"
5	F	26	"
6	F	28	"
7	F	28	"
8	M	29	"
9	M	29	"
10	M	29	"
11	M	29	"
12	M	29	"
13	M	29	"
14	F	30	"
15	F	31	"
16	M	31	"
17	M	32	"
18	F	33	"
19	M	34	"
20	M	42	"
21	M	43	"
22	M	45	"

ปริมาณโทลูอีนในซีรัมของเจ้าหน้าที่ห้องปฏิบัติการทางวิทยาศาสตร์ ซึ่งวิเคราะห์ด้วยวิธีเฮดสเปซ แก๊สโครมาโตกราฟี

ตัวอย่างที่	เพศ	อายุ	ปริมาณโทลูอีน (ไมโครกรัม/มิลลิลิตรซีรัม)
1	F	25	non-detectable
2	F	28	"
3	F	28	"
4	F	30	"
5	F	33	"
6	F	42	"
7	F	42	"

ประวัติผู้เขียน

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