

How Can Working in a Nail Salon Effect Your Health?

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Framing a Research Agenda to Advance Worker Health
and Safety in the Nail Salon and Cosmetology Communities

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Overview

- Chemicals in Salons
- Are Exposures in Salons Hazardous?
- Health Effects of Working in Salons
- Health Protection in Salons

What Chemicals are in Nail Products and are They Toxic?

Toxic = laboratory studies on mice, rats, fish, etc., shows that the animals are harmed by the chemical.

Low toxicity = takes a lot of the chemical to kill/harm the animals

High toxicity = takes less

Nail Products: Chemical Ingredients, Exposure Standards and Potential Health Effects

Nail Products	Common Chemical Ingredients	OSHA PEL /[TLV if lower] (ppm)	Potential Health Effects
Nail Polish (Basecoat, Colors, and Topcoats) <i>Includes: Pigments, Resins, Solvents, Plasticizers, Dispersants, and UV Stabilizers</i>	Ethyl acetate	400	Irritation eyes, skin, nose, throat; dermatitis
	Butyl acetate	150	Irritation eyes, skin, upper respiratory system; headache,
	Ethyl alcohol	1000	Irritation eyes, skin, nose; headache, CNS syndrome; cough; liver damage; anemia; reproductive effects
	Isopropyl alcohol	400	Irritation eyes, nose, throat; CNS syndrome, headache; dry, cracking skin
	Acetone	1000 [250]	Irritation eyes, nose, throat; headache; CNS syndrome; dermatitis
	Methyl ethyl ketone	200	Irritation eyes, nose, throat; headache; CNS syndrome; dermatitis
	Toluene	200 [50]	Irritation eyes, nose, throat; headache; CNS syndrome; dermatitis; dilated pupils, lacrimation; anxiety, muscle fatigue, insomnia; paresthesia; liver, kidney damage;
	Xylene	100	Irritation eyes, nose, throat; headache; CNS syndrome; corneal damage; dermatitis; reproductive effects
	Dibutyl phthalate	5 mg/m ³	Irritation eyes, upper respiratory system, stomach; reproductive effects (fetotoxic)
	Nitrocellulose	None [400]	Unknown
	Toluene Sulfonamide Formaldehyde Resin	None	Dermatitis
	Titanium dioxide	10 mg/m ³	Lung fibrosis; potential occupational carcinogen
Nail polish removers	Acetone	1000 [250]	see above
	Ethyl acetate	400	see above
	Butyl Acetate	150	see above

Nail Products: Chemical Ingredients, Exposure Standards and Potential Health Effects, con't

Artificial Nails Includes: acrylic polymers, hardeners, primers, dehydrators	Ethyl methacrylate	None	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
	Methyl methacrylate	100 [50]	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
	Butyl methacrylate	None	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
	Methacrylic acid	None [20]	Irritation eyes, skin, mucous membrane; eye, skin burns
	Methyl ethyl ketone	200	see above
Nail Tips Adhesives	Ethyl cyanoacrylate	None [0.2]	Irritation eyes, skin, nose, throat; allergic contact dermatitis; asthma
Artificial Nail Removers	Acetone	1000 [250]	see above
	N-methyl pyrrolidone	None	Dermatitis, reproductive effects
	Acetonitrile	40 [20]	Irritation nose, throat; asphyxia; nausea, vomiting; chest pain; CNS syndrome; convulsions; in animals: liver, kidney damage
Disinfectants (regulated by EPA)	Formalin (formaldehyde)	0.75	Irritation eyes, nose, throat, respiratory system; lacrimation; cough; wheezing; dermatitis; potential occupational carcinogen
	Isopropyl alcohol	400	see above
	Bleach (sodium hypochlorite)	None	Irritation eyes, nose, throat, respiratory system; skin sensitizer
	Hospital grade disinfectants	n/a	Allergens

Source: (Feeney, 2002); ACGIH, 2002 TLVs® and BEIs®; NIOSH Pocket Guide to Chemical Hazards; numerous nail products MSDS available at www.siri.org;

Are There Potential Hazardous Exposures to Nail Products in Salons?

Q: They have toxics in them...is it enough to make you sick?

Q 1: is there a lot of chemical?

Q 2: is the chemical getting into your body?



MATERIAL SAFETY DATA SHEET

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CND-N-047

Prepared to OSHA, ACC, ANSI and WHMIS Standards

MSDS Revision Date 11/01/2002

1. PRODUCT IDENTIFICATION

1.1	Product Name: CREATIVE COLORS NAIL ENAMELS
1.2	Chemical Name: SOLVENT POLYMER BLEND
1.3	Synonyms:
1.4	Trade Names: CREATIVE COLORS, NAIL ENAMELS, PINKIES
1.5	Product Use: COSMETIC USE ONLY
1.6	Manufacturer's Name: CREATIVE NAIL DESIGN, INC.
1.7	Manufacturer's Address: 1125 JOSHUA WAY, VISTA, CA U.S.A., 92083
1.8	Emergency Phone: ROCKY MOUNTAIN POISON CONTROL CENTER: 1-303-623-5716
1.9	Business Phone: 1-800-833-NAIL (6245)

Exposure limit: (ppm) how much chemical, how much air during an 8 hour day to prevent long term health problems

2. COMPOSITION & INGREDIENT INFORMATION

CHEMICAL NAME(S)	CAS NO.	%	EXPOSURE LIMITS IN AIR					OTHER
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	
TOLUENE	108-88-3	NA	50	150	200	NE	NE	C = 300
BUTYL ACETATE	123-86-4	NA	150	200	200	200	1700	TWA=150
ETHYL ACETATE	141-86-4	NA	400	NE	400	NE	2000	TWA=400
ISOPROPYL ALCOHOL	67-63-0	NA	400	500	400	500	2000	TWA=400
NITROCELLULOSE	9004-70-0	NA	10 mg/m ³	NE	10 mg/m ³	NE	NE	
DIBUTYL PHTHALATE	84-74-2	NA	5 mg/m ³	NE	5 mg/m ³	NE	NE	
CAMPHOR	76-22-2	NA	2 mg/m ³	4	2 mg/m ³	NE	NE	
OTHER COMPONENTS PRESENT IN LESS THAN 1% CONCENTRATION		BALANCE	THE REMAINING COMPONENTS DO NOT CONTRIBUTE ANY SIGNIFICANT ADDITIONAL HAZARDS					



MATERIAL SAFETY DATA SHEET

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3. HAZARD IDENTIFICATION

3.1	Hazard Identification:						
3.2	Routes of Entry:	Inhalation:	YES	Absorption:	YES	Ingestion:	YES
3.3	<p>Effects of Exposure:</p> <p>INGESTION: If product is swallowed, may cause nausea, vomiting and/or diarrhea and central nervous system depression.</p> <p>SKIN & EYES: Mildly to moderately irritating to the eyes. Symptoms of overexposure may include redness, itching, irritation and watering. May be irritating to skin in some sensitive individuals, especially after prolonged contact.</p> <p>INHALATION: Vapors of this product may be slightly irritating to the nose, throat and other tissues of the respiratory system. <u>Symptoms of overexposure can include coughing, wheezing, nasal congestion, and difficulty breathing.</u> Inhalation of vapors exceeding the levels listed in Section 2 (Composition & Ingredient Information) can cause central nervous system depression (e.g., <u>drowsiness, dizziness, headaches, nausea</u>).</p>						
3.4	<p>Symptoms of Overexposure:</p> <p>Symptoms of skin overexposure in some sensitive individuals may include redness, itching, and irritation of affected areas. Overexposure in eyes may cause redness, itching and watering.</p>						
3.5	<p>Acute Health Effects:</p> <p><u>Mild to moderate irritation to eyes and skin near affected areas.</u> Additionally, high concentrations of vapors can cause drowsiness, <u>dizziness, headaches and nausea.</u></p>						
3.6	<p>Chronic Health Effects:</p> <p>None known.</p>						
3.7	<p>Target Organs:</p> <p>Eyes, skin & respiratory system.</p>						

What are the Exposures? (the measured concentrations)

- Limited evaluation
- “Low levels” by OSHA standards
 - Measured exposures <20 ppm for volatiles
 - (vs. PELs = 100+ ppm)

Exposure Assessment for Vapors and Dusts in 6 Salons

Chemical	Mean TWA Concentration
Toluene	0.8 ppm
Isopropyl Alcohol	15.6 ppm
Butyl Acetate	0.4 ppm
Ethyl Methacrylate	4.5 ppm
DUSTS	
Respirable	0.9 mg/m ³
TOTAL	1.4 mg/m ³

(Hiipakka and Samimi 1987)

Self-Reported Exposures

(survey of Boston-area nail techs: n=71)

- 12 (17%): average air quality “terrible” or “needs improvement”
- 14 (20%): not enough fresh air
- 41 (58%): chemicals in the air
- 65 (92%): dust
- 56 (79%): named something with a strong or irritating smell

Indoor Air Quality Metrics in 22 Boston Area Nail Salons

	Reference	Average	95% CI	Low	High
Carbon Dioxide (ppm)	<700*	893	(765.3, 1021.6)	470	1550

14 of 22 (64%) had no form of mechanical ventilation

Are the systems in salons the appropriate design? Are they maintained? Are they operated?

*ASHRAE: beauty salons should have 25 cfm fresh air per person mechanically provided

HETA 92-128-2241
JULY 1992
TINA AND ANGELA'S NAIL SALON
SPRINGDALE, OHIO

NIOSH INVESTIGATORS:
John Decker, M.S.
Amy Beasley

I. Summary

In response to a request from the Springdale Health Department in Springdale, Ohio, representatives from the National Institute for Occupational Safety and Health (NIOSH) conducted an industrial hygiene evaluation of exposures to chemicals used during the application of sculptured nails. The request stated that an adjacent business in the same building had complained of a "terrible odor" emanating from the nail salon. No health effected were noted on the request.

Bulk samples of liquids and powders used to sculpture nails were collected and analyzed qualitatively by gas chromatography/mass spectrometry. Based on these results, personal and area air sampling was conducted in the nail salon for methyl and ethyl methacrylate, acetone, and benzene. No methyl methacrylate or benzene vapors were detected. Low concentrations of ethyl methacrylate (ranged from non-detected to 7 parts per million [ppm]) and acetone vapors (6 and 10 ppm) were detected. There are no occupational exposure criteria for ethyl methacrylate; however, *Patty's Industrial Hygiene and Toxicology* suggests that industrial hygiene recommendations for methyl methacrylate can be applied to ethyl methacrylate. All exposures were below the NIOSH Recommended Exposure Limit (REL) time-weighted average (TWA) criteria of 100 ppm for methyl methacrylate and 250 ppm for acetone.

An inspection of the heating and cooling system serving the salon indicated that there was no provision for the mechanical introduction of outside air to the salon. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) recommends that 25 cubic feet per minute (cfm) of outside air be supplied to beauty salons.

Several chemicals (methacrylates, acetone) used in nail salons emit vapors having low odor thresholds. Under certain conditions these odors can be detectable in adjacent businesses. However, concentrations of these vapors, as measured on the day of the NIOSH survey, do not constitute a health hazard to the workers and customers at Tina and Angela's Nail Salon or to adjacent businesses. Recommendations to prevent the migration of vapors from the salon to adjacent businesses can be found in Section VII of this report.

If chemical levels are low, why do people feel like they aren't?

- Salon workers and owners are exposed to low levels of multiple, mixed chemicals over long workdays/weeks
- Exposure limits are
 - Wrong
 - Not even trying to be right
- Not enough fresh air in salons
- Strong odors

What Work-Related Health
Effects do Salon Workers
Experience?

Self-Reported Respiratory Effects and Work Relatedness Among Vietnamese-American Nail Technicians (n=71)

Health Effect	Frequency (%) (95% CI)	Better when away from work: Frequency (%) (95% CI)
Respiratory irritation	22 (31%) (21%, 43%)	16 (23%) (13%, 34%)
Difficulty breathing	13 (18%) (10%, 29%)	8 (11%) (5%, 21%)
Doctor-diagnosed asthma	2 (3%) (0.3%, 10%)	1 (1%) (0.0%, 7.6%)
Any respiratory symptom (difficulty breathing, regular cough, sinus/nasal, irritation)	31 (44%) (32%, 56%)	21 (30%) (19%, 42%)

Other Self-Reported Symptoms

- 31 (44%) reported work-related headaches
- 45 (63%): said there were odors at work that made them feel bad
- 17 (24%) reported being allergic to something at work
- 22 (31%) reported skin problems (mostly face/hands)

Association between Self-Reported Exposures and Respiratory Symptoms

Exposure Variable	Count	Prevalence of work-related respiratory symptoms	Prevalence rate ratio (PR) & P-value
Air quality			
Bad	12	67%	PR = 3.2; Exact = 0.003*
Good	58	21%	
Fresh air			
Not enough	14	64%	PR = 3.1; Exact = 0.003*
Enough	57	21%	
Chemicals in air			
Yes	41	27%	PR = 0.8; Chisq = 0.5
No	30	33%	
Air Brought in From Outside			
Yes	59	25%	PR = 2.0; Exact= 0.16
No	12	50%	
Ventilation Devices in Salon			
Yes	38	18%	Chisq= 0.016*
No	31	45%	
Concerned about Chemicals			
Very/Somewhat	55	36%	PR = 5.5; Exact= 0.03*
Not concerned	15	7%	

Alameda County Nail Salon Worker Survey – 201 respondents in 74 shops

- “Have you ever experienced any of the following health problems after you started working in a nail salon?”
 - Skin irritations, Difficulty in breathing, Chronic pains (e.g. back, shoulder or hand), Asthma, Bad pregnancy outcome, Cancer, Other
- Results
 - Any Reported Health Problems: 125 (62%)
 - Health Symptoms Related to Solvents: 94 (47%)
 - Chronic Pain & Other Symptoms: 85 (42%)
 - Concerned about Chemicals: 160 (80%)

Health Protection in Salons

Prevention and Controls

(Boston survey, n=71)

- 59 (83%): said that there was fresh air from the outside
- 44 (62%): ventilation system
- 38 (54%): “other” ventilation device
- 64 (90%) reported wearing a mask
 - 89% of those: “A paper or cloth mask like a medical or surgical mask”

Why do you wear a mask?

“Because I am young and pregnant and I don't want to breathe in the dust and chemicals; I'm afraid that it might affect my child later on.”

“Keep hygiene for self and others.”

“Polite way to protect health, avoid chemicals.”

“Prevent coughing, itching of neck, redness of skin, itching of face, tearing.”

“Prevent dust, bad odors when sanding and filing acrylic nails, I have to bend very close.”

Describe “other” Ventilation

- “One large fan located by the back door and each nail table has a ventilating machine, under the table with a bag that filters dust.”
- “Six small fans to suck up. I bought a ventilator that filters toxic chemicals and dust and install it close to the entrance door. Pump in clean air.”
- “Don't have ventilation system, when weather warm, open windows. Stores with air vent machines are better.”
- “There is a ventilator on the ceiling that sucks dirty air outside.”
- “Two fans filtering the air placed by front and back door, bad air goes in and is filtered into good air.”



<http://www.latimes.com/business/la-fi-nails30mar30,1,4858779.story?ctrack=1&cset=true>

OPI removes carcinogen from nail care products

The salon supplier says it has changed its formula to end the use of toluene in its polishes.

By Abigail Goldman
Times Staff Writer

March 30, 2007

A San Fernando Valley nail polish maker that is a major supplier to salons across the country said that it had removed the chemical toluene from its products.

The **Campaign for Safe Cosmetics** had asked OPI Products Inc. to remove toluene, formaldehyde and dibutyl phthalate, or DBP, from its products.

In a letter to an activist group, OPI also said it had stopped using DBP and was looking for alternatives to formaldehyde.

What to Do?

- Reduce toxicity, volatility/odor and hazard potential of nail salon products!
- Local exhaust ventilation to collect dust at the point of generation
 - shrouded mechanical nail files used in podiatry
- Improve general ventilation
 - 25 cfm fresh air
 - Dedicated exhaust
- Good work practices – avoid getting chemical in air and on skin