"Toxic Paints"

A research report on Lead Content in Household and Decorative Paints

Toxics Link

for a toxics-free world

About Toxics Link

Toxics Link is an Indian environmental research and advocacy organization set up in 1996, engaged in disseminating information to help strengthen the campaign against toxics pollution, provide cleaner alternatives and bring together groups and people affected by this problem. Toxics Link's Mission Statement - "Working together for environmental justice and freedom from toxics. We have taken upon ourselves to collect and share both information about the sources and the dangers of poisons in our environment and bodies, and information about clean and sustainable alternatives for India and the rest of the world."

Toxics Link has a unique expertise in areas of hazardous, medical and municipal wastes, international waste trade, and the emerging issues of pesticides, Persistent Organic Pollutants (POPs), hazardous heavy metal contamination etc. from the environment and public health point of view. We have successfully implemented various best practices and have brought in policy changes in the aforementioned areas apart from creating awareness among several stakeholder groups.

RESEARCH TEAM:

Piyush Mohapatra
Dr. Prashant Rajankar

A report by

Toxics Link

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Abbreviations

BIS	---	Bureau of Indian Standards
CPSC	---	Consumer Product Safety Commission
GAELP	---	The Global Alliance to Eliminate Lead Paint
ICCM	---	The International Conference on Chemicals Management
IQ	---	Intelligence quotient (IQ),
MoEF&CC	---	Ministry of Environment Forest and Climate Change
NABL	---	National Accreditation Board for Testing and Calibration Laboratories
NCR	---	National Capital Region
NGOs	---	Non Government Organizations
PPM	---	Parts Per Million
SAICM	---	Strategic Approach to International Chemical Management
SMEs	---	small and medium-sized enterprises
TL	---	Toxics Link
UNEP	---	United Nations Environment Program (Now UN Environment)
WHO	---	World Health Organization
µg/dL	---	Microgram per Deciliter

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Introduction

Lead (Pb) is a toxic heavy metal which is commonly used in different consumer products including household decorative paints. Lead compounds commonly used as the pigments in paints such as lead chromates, lead oxides, lead molybdates, and lead sulfates; and the most common form is lead tetroxide, sometimes called red lead or minimum.[1] Paint manufacturers intentionally add lead compounds to the paint for the following purposes;

- To give the paints its color;
- Helps to spread evenly and dry fast;
- Act as a corrosion resistance agents (inhibits rusting and corrosion on metal surfaces).

Lead a Health Hazards

- Lead has no essential role in the human body and lead poisoning accounts for about 0.6% of the global burden of disease".[2] (WHO)
- According to the Centers for Disease Control and Prevention, the most common sources for lead poisoning in children can be from paint, as well as toys manufactured with lead in paint, plastic or metal.[3]
- No safe blood lead level in children has been identified4
- At high levels of exposure, lead attacks the brain and central nervous system to cause coma, convulsions and even death
- Children who survive severe lead poisoning may be left with mental retardation and behavioral disorders
- Lead can affect children's brain development resulting in reduced intelligence quotient (IQ), behavioral changes such as reduced attention span and increased antisocial behavior, and reduced educational attainment.

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[1] http://toxicslink.org/docs/lead_in_paints/Lead-in-Paint2013.pdf

[2] Verstraeten, S.V., et al, Aluminium and lead: molecular mechanisms of brain toxicity, (Archives of Toxicology 82:789–802. DOI 10.1007/s00204-008-0345-3, 2008)

[3] https://www.thespruce.com/why-toys-containing-lead-are-dangerous-3255888

[4] https://www.cdc.gov/nceh/lead/

- Lead exposure also causes anemia, hypertension, renal impairment, immunotoxicity and toxicity to the reproductive organs. The neurological and behavioral effects of lead are believed to be irreversible
- There is no known safe blood lead concentration. But it is known that, as lead exposure increases, the range and severity of symptoms and effects also increases
- Even blood lead concentrations as low as 5 μg/dL, once thought to be a "safe level", may be associated with decreased intelligence in children, behavioral difficulties, and learning problems

Global Movement to Phase out Lead from Paints

Lead is a very common ingredient widely used in the paints across the globe. However after the health impact of lead is surfaced, the countries started initiative to phase out lead from various products including paints. In Europe and USA lead has been phased out from the paints in 1970s however it is still being used as an important ingredient in the developing countries including in India.

In 2008, International Conference on Chemical Management -1(ICCM-1) of Strategic Approach to International Chemical Management (SAICM), identified lead in paints is an issue of global concern and proposed actions to phase out Lead from decorative paints. So to take actions at the global stage, an alliance was formed "The Global Alliance to Eliminate Lead Paint" (GAELP)[5] jointly led by UN Environment and the World Health Organization which in supported by UNEP/WHO Advisory Group, Governments, NGOs, Industry, and Academia are Alliance partners.[6]

The overall aim of the alliance is to prevent children's exposure to paint containing lead and to minimize occupational exposure to lead paint. The goal is to phase out the manufacture and sale of lead paint from the globe to eliminate the lead poison.

[5] http://www.who.int/ipcs/assessment/public_health/framework.pdf?ua=1
[6] https://www.epa.gov/sites/production/files/2015-11/documents/unep_overview_of_alliance.pdf

Status of lead Paints in India

In India there was a strong movement to phase out Lead from gasoline and have been eliminated out from gasoline in 2000. However there was no concern or awareness to phase out lead from paints.

In 2007 Toxics Link carried out the first study to check the lead contents in enamel paint sold in Indian market and the study revealed very high amount (140000 ppm and the average of 31 samples was 26131 ppm) of lead in all the collected samples except in one sample. Nevertheless all these samples tested were from all the major paint manufactures. Later Toxics Link carried out series of research studies from 2009-15 to build up the campaign and awareness to phase out lead from paints in India. The studies showed high level lead content in the paints sold in India however at the same time gave an indication of decline of lead content in paints samples of major manufacturers. These studies raised concerns on the alarming level of lead found in the paints of small and medium scale manufacturers.

Lead in Paints Regulations in India

In November, 2016 the Ministry of Environment Forest and Climate Change (MoEF&CC) issued the gazette notification "The Regulation of Lead Contents in Household and Decorative Paints Rules, 2016." Some of the important features of the said regulations are:

- Restrict the use of lead in paints in house hold and decorative paints surface coating materials in interior and exterior of buildings, walls, civil structures, any consumer products meant for household purposes and shall include enamel, primer, interior, undercoating and finishing coloring materials as prescribed in the Indian Standards for Household and Decorative Paints published by the Bureau of Indian Standards (BIS).
- The regulations meant for all the decorative and household paints sold in India
- Restrict the lead content of these paints to 90 PPM.
- Labeling and self certification on paints by the manufacturers that lead content does not exceed to 90 ppm.
- Authorized laboratories have been assigned to test the samples

- The central pollution control board will be the nodal agency to check compliance of the standard

As per the notification of the MoEF&CC, the standard of 90 ppm will be enforced from November 2017.

Objectives of the study

- To assess the quantum of lead in the household paints after the regulation came into effect.
- To find out the impact of the present regulation on the manufacturing practices of the paints

Content 2

Materials and Methods

In the present study total 15 samples were collected mostly from the small and medium-sized enterprises (SMEs), including two from major paint manufacture. These paints were from 13 different brand names (two brands are repeated for different colors) produced by 7 manufacturers. Based on the experiences from the earlier studies, san golden yellow, white, PO red and phiroza (blue) color were considered for testing. The availability of these paints in retail establishments indicated that they were intended to be used for household purposes.

Preparation of the paint samples and laboratory analysis

The samples were prepared using a single use stirring stick, single use brush, glass piece for each samples were arranged. Each paint can was labeled with the number and then well shake before preparation of a sample. The paints were stirred well with wooden stick for uniform mixing and applied with a separate unused single-use brush on an individual, numbered, unused, glass piece. All the samples were kept for air dry for 4 days. After each sample was dry it was scraped off from glass surfaces and was collected in clean polyethylene bags and sent to the NABL accredited laboratory based in New Delhi for the analysis total lead content using standard operating protocol (CPSC-CH-E1003-09.1).[7]

[7] https://www.cpsc.gov/s3fs-public/pdfs/blk_pdf_CPSC-CH-E1003-09_1.pdf

Content 3

Results and Observations

- A total of 15 cans of enamel decorative paints were purchased in Delhi-NCR, and analyzed for their lead content.
- A majority of these paint samples, 12 out of 15, were produced by SMEs and found high lead
- The average concentration of all analyzed paints was 18099 ppm
- Very high lead concentrations above 10,000 ppm were found in 6 paint samples and 11 paint samples had lead concentrations above 90 ppm.
- Only 4 paint samples analyzed in this study are adhering to the lead in paints regulation of the country.
- All these four samples have lead concentration below 90 ppm.
- Out of these four samples tested below 90 PPM, two samples are from SMEs.

Lead Concentration by Color

- In total 11 paint samples from all collected colors contain lead concentrations above 90 ppm (Fig. 1)
- Lead concentrations above 90 ppm were found in 6 out of 8 paints of yellow color (75%), 3 out of 5 paints of white color (60%)
- Both bright colored samples also were found lead concentration above 90 ppm (179 ppm in PO red and 2800 ppm in Phiroza)

Table 1 –Lead concentration of different paint samples

SN	Sample code	Result	Color
1	TL-1	179.29	PO Red
2	TL-2	2800	Phiroza
3	TL-3	8.25	White
4	TL-4	28800	G. Yellow
5	TL-5	54200	G. Yellow
6	TL-6	4.89	G. Yellow
7	TL-7	27.41	White
8	TL-8	3.31	G. Yellow
9	TL-9	24200	G. Yellow
10	TL-10	20600	G. Yellow
11	TL-11	74200	G. Yellow
12	TL-12	62400	G. Yellow
13	TL-13	256.9	White
14	TL-14	2400	White
15	TL- 15	1400	White
	Min	3.31	
	Max	74200	
	Average	18098.67	

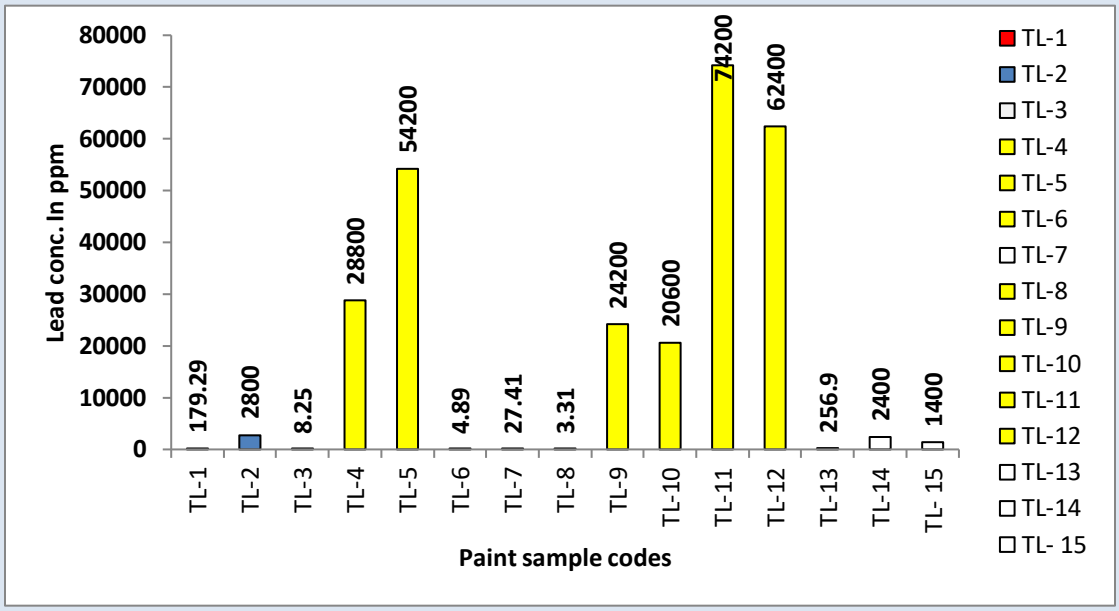

Figure 1 –Lead content in different paints

Observations

While the preset study compared with the earlier research studies (2013 and 2015), it was observed that, out of 250 paint samples only 10% (26 paint samples) samples were found below 90ppm of lead and 90% (224 paint samples) samples found above 90ppm of lead in 2013. Similarly out 101 paint samples only 5% (5 paint samples) samples were found below 90 ppm of lead and 95% (96 paint samples) samples found above 90 ppm of lead in 2015.

In the present study only 15 samples were collected to check the current situation out of which only 27% (4 paint samples) samples were found below 90ppm of lead and 73% (11 paint samples) samples found above 90ppm of lead. (Fig 2). In general, there is hardly any change of lead content of paints in ground level in spite of the regulation is in place.

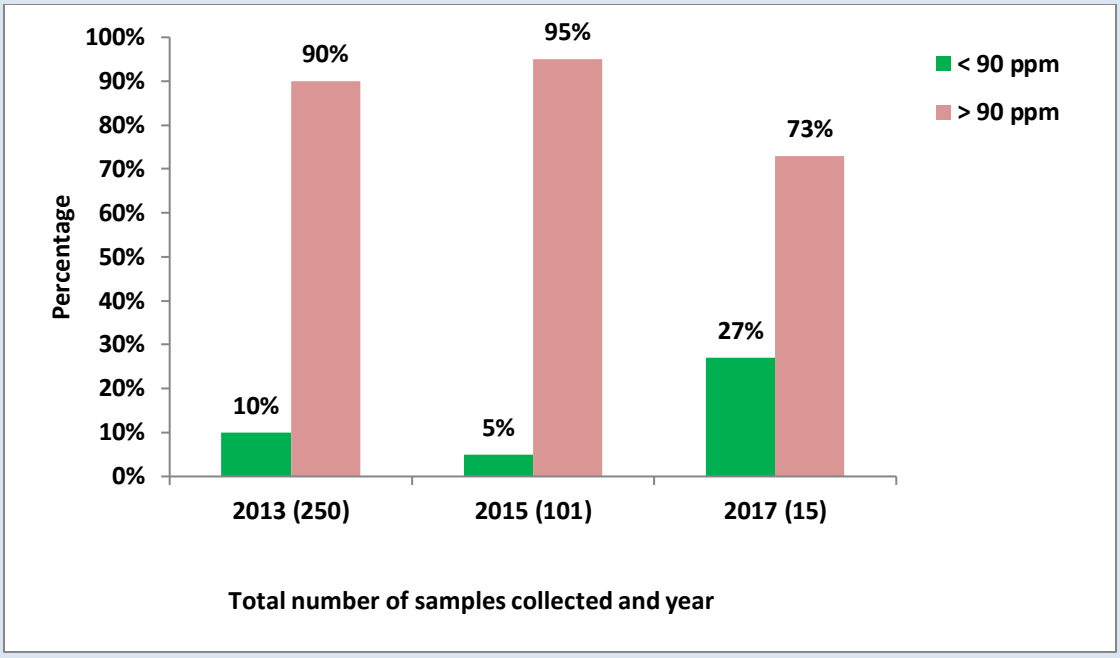

Figure 2 –Year wise Comparison of paint sample based on lead concentration (below and above 90 ppm)

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Conclusions

Lead in paints is one of the most critical environmental and health issues globally and the countries have been taking affirmative action to phase out lead from paints considering the children's health. Toxics link is doing the analysis of the samples since 2007 however even after ten years there is little change in the ground on the manufacturing practices by the small and medium scale manufacturers. Only silver lining is the shift to lead free paint by the major brand manufacturers.

Further the present study also reflects that there is no impact with the small and medium scale enterprises of the proposed lead standard in paints set by MOEF and CC. However at the same time low lead is found in one small and medium manufacture, indicates the ability of the SMEs to make lead safe paints. The existing bottlenecks perhaps due to lack of information and awareness among SMEs on the proposed regulations. Therefore the concerned departments may need to wake up the situation and act fast to ensure a better enforcement of the regulations which is critical to the environment and children health.

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