

LEAD IN SOLVENT-BASED PAINTS FOR HOME USE IN CAMEROON



June 2017



NATIONAL REPORT

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ACKNOWLEDGMENTS

We take this opportunity to thank all those who were instrumental in compiling and shaping this paint study.

The analytical study providing data to this report was undertaken as part of the Lead Paint Elimination Project in Africa, funded by the Global Environment Facility (GEF), implemented by UN Environment and executed by IPEN. The Lead Paint Elimination Project in Africa was established to eliminate lead in paint and raise widespread awareness among business entrepreneurs and consumers about the adverse human health impacts of lead-based household enamel paints, particularly on the health of children under six years old. The study was conducted in Cameroon by the Centre de Recherche et D'Education pour le Développement (CREPD) in partnership with IPEN.

This report was developed by CREPD and IPEN as part of IPEN's Global Lead Paint Elimination Campaign.

While this study was undertaken with the assistance of the Global Environment Facility and UN Environment, responsibility for the content lies entirely with IPEN and CREPD. The GEF and UN Environment do not necessarily share the expressed views and interpretations.

Established in 1998, IPEN is currently comprised of over 500 Participating Organizations in 116 countries, primarily developing and transition countries. IPEN brings together leading environmental and public health groups around the world to establish and implement safe chemicals policies and practices that protect human health and the environment. IPEN's mission is a toxics-free future for all.



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PREFACE

Lead paints for home use continue to be widely produced, sold, and used in developing countries despite the fact that most highly industrial countries banned lead paints for household use more than 40 years ago. IPEN and Participating Organizations are part of the global movement to eliminate lead paint by 2020 to protect children's health.

In 2007 and 2008, NGOs in the IPEN network collected and analyzed decorative (home use) paints on the market in 11 developing countries, and in countries with economies in transition. The results were startling. In every one of these countries, many of the paints contained dangerously high lead levels. In response, IPEN launched its Global Lead Paint Elimination Campaign, which seeks to eliminate lead in paint and raise widespread awareness among business entrepreneurs and consumers about the adverse human health impacts of lead paint, particularly on the health of children. Since then, IPEN-affiliated NGOs and others have sampled and analyzed paints on the market in approximately 50 low- and middle-income countries.

This report presents new data on the total lead content of solvent-based paints for home use available on the market in Cameroon. It also presents background information on why the use of lead paint is a source of serious concern, especially to children's health; a review of national policy frameworks that are in place to ban or restrict the manufacture, import, export, distribution, sale and use of lead paint, and provides a strong justification to adopt and enforce further regulatory controls in Cameroon. Finally, it proposes action steps by different stakeholders to protect children and others from lead paint.

This study was conducted by CREPD in partnership with IPEN.

IPEN is an international NGO network of health and environmental organizations from all regions of the world of which CREPD is a member. IPEN is a leading global organization working to establish and implement safe chemicals policies and practices to protect human health and the environment. Its mission is a toxics-free future for all. IPEN helps build the capacity of its member organizations to implement on-the-ground activities, learn from each other's work, and work at the international level to set priorities and achieve new policies.

CREPD is a Cameroon-based Health and Environmental NGO aiming to bridge the gap between science and action in sub-Saharan Africa and beyond. Established in 2004, CREPD is a unique NGO within Cameroon with a technical scientific background and is a well-respected resource for government ministries on chemicals management issues. The organization serves on a number of advisory committees and has an excellent working relationship with government, research institutions, and other stakeholders. CREPD also has a successful track record in obtaining multi-year funding from international funders and in executing projects as envisioned.

EXECUTIVE SUMMARY

Lead is a toxic metal that causes adverse effects on both human health and the environment. While lead exposure is also harmful to adults, lead exposure harms children at much lower levels, and the health effects are generally irreversible and can have a lifelong impact.

The younger the child, the more harmful lead can be, and children with nutritional deficiencies absorb ingested lead at an increased rate. The human fetus is the most vulnerable, and a pregnant woman can transfer lead that has accumulated in her body to her developing child. Lead is also transferred through breast milk when lead is present in a nursing mother.

Evidence of reduced intelligence caused by childhood exposure to lead has led the World Health Organization (WHO) to list “lead-caused mental retardation” as a recognized disease. WHO also lists it as one of the top ten diseases whose health burden among children is due to modifiable environmental factors.

Lead paint is a major source of childhood lead exposure. The term lead paint is used in this report to describe any paint to which one or more lead compounds have been added. The cut-off concentration for lead paint used in the report is 90 parts per million (ppm, dry weight of paint), the strictest legal limit enacted in the world today. All lead concentrations in the report are total lead levels, unless otherwise specified.

Most highly industrial countries adopted laws or regulations to control the lead content of decorative paints—the paints used on the interiors and exteriors of homes, schools, and other child-occupied facilities—beginning in the 1970s and 1980s. In Cameroon, there is currently no regulation in place limiting the amount of lead in paint for household and decorative use. However, there is an ad hoc governmental committee tasked to develop a regulation on lead in paint.

From September 2016 to January 2017, CREPD purchased a total of 65 cans of solvent-based paint intended for home use from stores in Yaoundé and Douala, the two major cities in Cameroon. The sampled paints include 46 decorative paints, 5 of which were aerosol or spray paints, and 19 anticorrosive paints. These paints represented 23 different brands produced by 19 manufacturers. All paints were analyzed by an accredited laboratory in the United States of America for their lead content, based on dry weight of the paint. The laboratory participates in the Environmental Lead Proficiency Analytical Testing (ELPAT)

program operated by the American Industrial Hygiene Association (AIHA), assuring the reliability of the analytical results.

RESULTS

28 out of 65 analyzed solvent-based paints (43 percent of paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm, dry weight of paint). This is also the regulatory limit for lead in decorative paint in e.g., India, the Philippines, and the United States of America. Moreover, 10 paints (15 percent paints) contained dangerously high lead concentrations above 10,000 ppm. The highest lead concentration detected was 220,000 ppm in an orange Smalto anticorrosive minium (lead tetroxide) paint used in many applications in buildings and homes.

On the other hand, 37* out of 65 solvent-based paints for home use (57 percent of paints), including 22 out of 32 locally manufactured paints (69 percent of paints manufactured in Cameroon) contained lead concentrations at or below 90 ppm, suggesting that the technology to produce paint without lead ingredients exists in Cameroon.

13 out of 23 analyzed brands (57 percent of paint brands) sold at least one lead paint, i.e., a paint with lead concentration above 90 ppm. 5 out of 23 analyzed brands (22 percent of paint brands) sold has at least one lead paint with dangerously high lead concentrations above 10,000 ppm.

Yellow paints most frequently contained dangerously high lead concentrations above 10,000 ppm. Of 12 yellow paints, 5 (42 percent of yellow paints) contained lead levels above 10,000 ppm; of 22 red paints, 3 (14 percent of red paints) contained lead levels above 10,000 ppm; of 3 orange paints, 1 (33 percent of orange paints) contained lead levels above 10,000 ppm; and of 8 green paints, 1 (12 percent of green paints) contained lead levels above 10,000 ppm.

In general, paint can labels did not carry meaningful information about lead content or the hazards of lead paint. Only 6 out of 65 paints (9 percent of paints) provided information about lead on their labels and most paints carried little information about any ingredients on can labels. In addition, one paint contained 26,000 ppm lead despite advertisement or claim on its product label that they contain “less than 90 ppm lead.” Most paints were merely labeled as

* Fourteen paints (with sample numbers CMR-169, CMR-175, CMR-176, CMR-184, CMR-197, CMR-198, CMR-199, CMR-200, CMR-201, CMR-203, CMR-204, CMR-205, CMR-212, and CMR-218) contained lead concentrations “below 300 ppm,” “below 200 ppm,” or “below 100 ppm.” For this report, these were approximated as “below 90 ppm” in order to compare them to the 90-ppm cut-off limit. It should however be noted that this may lead to an underestimation of the number of paints containing lead concentrations above 90 ppm.

“solvents, pigments and resin,” with no further details on the type of solvents and pigments (organic or inorganic) provided on paint can labels. Manufacturing dates or batch numbers were included on the labels of 26 out of 65 paints (40 percent of paints) included in this study. Most warning symbols or pictograms on the paint cans indicated the flammability of the paints, but had no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

The first lead paint study in Cameroon was conducted by CREPD in 2011. In that study, 60 solvent-based paints from 16 brands were sampled and analyzed. 67 percent of the paints contained lead levels above 90 ppm, while 25 percent contained lead levels greater than 10,000 ppm.

In 2015, CREPD conducted another study and analyzed 47 solvent-based paints from 19 brands. In that study, 47 percent of paints contained lead levels above 90 ppm, while 17 percent contained lead levels above 10,000 ppm.

Comparing the three studies undertaken in 2011, 2015 and 2017 shows a gradual increase of the percentage of paints with lead levels below 90 ppm—from 33 percent in 2011, 53 percent in 2015 to 57 percent in 2017. Also, a slight decrease in the percentage of paints with dangerously high lead levels above 10,000 ppm can be observed (from 25 percent in 2011, 17 percent in 2015 to 15 percent in 2017).

CONCLUSIONS

This study demonstrates that solvent-based paints for home use with high concentrations of lead are still widely available in Cameroon since the paints included in this study are brands commonly sold in retail stores all over Cameroon. However, a slight improvement over time can be seen and the fact that 37 out of 65 paints (57 percent of paints), including 22 out of 32 locally manufactured paints (69 percent of paints manufactured in Cameroon) contained lead concentrations below 90 ppm, indicates that the technology to produce paints without added lead exists in Cameroon. The study results provide a strong justification to adopt and enforce a regulation that will ban the manufacture, import, export, distribution, sale and use of paints with total lead concentrations greater than 90 ppm in Cameroon.

RECOMMENDATIONS

To address the problem of lead in paint, CREPD and IPEN propose the following recommendations:

Government and Government Agencies

The Government of Cameroon should immediately finalize and enact the regulation that has been under consideration in the Office of the Prime Minister for more than one and a half years. The Government should make sure that the final regulation will ban the manufacture, import, export, distribution, sale and use of paints that contain total lead concentrations exceeding 90 ppm, the most restrictive standard in the world. The regulation should also require paint companies to display sufficient information indicating harmful content on paint can labels such as solvents, product's batch number and provide a warning on possible lead dust hazards when disturbing painted surfaces.

Paint Industry

Paint companies that still produce lead paints should expeditiously stop the use of leaded paint ingredients in paint formulations. Paint companies should indicate the lead content of their products and provide warnings on lead dust hazards on paint can labels. Retailers should also demand labeled products from paint companies. Paint companies that have shifted to non-lead paint production should get their products certified through independent, third party verification procedures to increase the customer's ability to choose paints with no added lead.

Paint Brands Representatives or Brand Holders

Paint brand holders shall request properly labeled paint cans from their suppliers indicating the lead content of their products and warning notifications of lead and lead dust hazards.

Individual, Household and Institutional Consumers

Paint consumers should demand paints with no added lead from paint manufacturers and retailers, as well as full disclosure of a paint product's content. Household and institutional consumers should ask for, consciously buy, and apply only paints with no added lead in places frequently used by children such as homes, schools, day care centers, parks and playgrounds.

Organizations and Professional Groups

Public health groups, school communities, consumer organizations and other concerned entities should support the elimination of lead paint, and conduct activities to inform and protect children from lead exposure through lead paint, lead in dust and soil, and other sources of lead.

All Stakeholders

All stakeholders should come together and unite in promoting a strong policy that will eliminate lead paint in Cameroon and ensure efficient enforcement mechanisms.

1. BACKGROUND

1.1 HEALTH AND ECONOMIC IMPACTS OF LEAD EXPOSURE

Children are exposed to lead from paint when lead-containing paint on walls, windows, doors or other painted surfaces begins to chip or deteriorate, since this causes lead to be released to dust and soil. When a surface previously painted with lead paint is sanded or scraped in preparation for repainting, very large amounts of lead-contaminated dust is produced, which, when spread, can constitute a severe health hazard.^[1]

Children playing indoors or outdoors get house dust or soil on their hands, and then ingest it through normal hand-to-mouth behavior. If the dust or the soil is

Lead Paint Terminology

As used in this booklet:

- “Paint” includes varnishes, lacquers, stains, enamels, glazes, primers, or coatings used for any purpose. Paint is typically a mixture of resins, pigments, fillers, solvents, and other additives.
- “Lead paint” is paint to which one or more lead compounds have been added.
- “Lead pigments” are lead compounds used to give a paint product its color.
- “Lead anti-corrosive agents” are lead compounds used to protect a metal surface from rusting or other forms of corrosion.
- “Lead driers” are lead compounds used to make paint dry more quickly and evenly.
- “Decorative paint” refers to paints that are produced for use on inside or outside walls, and surfaces of homes, schools, commercial buildings, and similar structures. Decorative paints are frequently used on doors, gates, and windows, and to repaint household furniture such as cribs, playpens, tables, and chairs.
- “Solvent-based, enamel decorative paint” or “enamel decorative paint” refers to oil-based paints.
- “ppm” means parts per million total lead content by weight in a dried paint sample. All lead concentrations in the report are total lead levels, unless otherwise specified.



contaminated with lead, the children will ingest lead. Hand-to-mouth behavior is especially prevalent in children aged six years and under, the age group most easily harmed by exposure to lead. A typical one- to six-year-old child ingests between 100 and 400 milligrams of house dust and soil each day.^[2]

In some cases, children pick up paint chips and put them directly into their mouths. This can be especially harmful because the lead content of paint chips is typically much higher than what is found in dust and soils. When toys, household furniture, or other articles are painted with lead paint, children may directly ingest the lead-contaminated, dried paint when chewing on them. Nonetheless, the most common way that children ingest lead is through lead-contaminated dust and soil that gets onto their hands.^[3]

While lead exposure is also harmful to adults, lead exposure harms children at much lower levels. In addition, children absorb up to five times as much of ingested lead than adults. Children with nutritional deficiencies absorb ingested lead at an even increased rates.^[2]

The younger the child, the more harmful lead can be and the health effects are generally irreversible and can have a lifelong impact. The human fetus is the most vulnerable, and a pregnant woman can transfer lead that has accumulated in her body to her developing child.^[4] Lead is also transferred through breast milk when lead is present in a nursing mother.^[5]

Once lead enters a child's body through ingestion, inhalation, or across the placenta, it has the potential to damage several biological systems and pathways. The primary target is the central nervous system and the brain, but lead can also affect the blood system, the kidneys, and the skeleton.^[6] Lead is also categorized as an endocrine-disrupting chemical (EDC).^[7]

It is generally agreed that one key element in lead toxicity is its capacity to replace calcium in neurotransmitter systems, proteins, and bone structure, altering function and structure and thereby leading to severe health impacts. Lead is also known to affect and damage cell structure.^[8]

According to the World Health Organization (WHO): "Lead has no essential role in the human body, and lead poisoning accounts for about 0.6 percent of the global burden of disease."^[2] Evidence of reduced intelligence caused by childhood exposure to lead has led WHO to list "lead-caused mental retardation" as a recognized disease. WHO also lists it as one of the top ten diseases whose health burden among children is due to modifiable environmental factors.^[9]

In recent years, medical researchers have been documenting significant health impacts in children from lower and lower levels of lead exposure.^[2, 6] According to the factsheet on Lead Poisoning and Health from WHO: “There is no known level of lead exposure that is considered safe.”^[10]

When a young child is exposed to lead, the harm to her or his nervous system makes it more likely that the child will have difficulties in school and engage in impulsive and violent behavior.^[11] Lead exposure in young children is also linked to increased rates of hyperactivity, inattentiveness, failure to graduate from high school, conduct disorder, juvenile delinquency, drug use, and incarceration.^[2] Lead exposure impacts on children continue throughout life and have a long-term impact on a child’s work performance, and—on average—are related to decreased economic success.

A recent study investigating the economic impact of childhood lead exposure on national economies in all low- and middle-income countries estimated a total cumulative cost burden of \$977 billion international dollars* per year.^[12] The study considered the neurodevelopmental effects on lead-exposed children, as measured by reduced IQ points, and it correlated lead exposure-related reductions in children’s IQ scores to reductions in lifetime economic productivity, as expressed in lifelong earning power. The study identified many different sources of lead exposure in children, with lead paint as one major source. Broken down by region, the economic burden of childhood lead exposure as estimated by this study was:

Africa: Intl\$134.7 billion of economic loss, or 4.03 percent of Gross Domestic Product (GDP);

Latin America and the Caribbean: Intl\$142.3 billion of economic loss, or 2.04 percent of GDP; and

Asia: Intl\$699.9 billion of economic loss, or 1.88 percent of GDP.

Country estimates used in this study can be accessed at a publically available website, <http://www.med.nyu.edu/pediatrics/research/environmentalpediatrics/leadexposure>, and shows that *economic loss in Cameroon is estimated at Intl\$2.52 billion, or 5.28 percent of Gross Domestic Product (GDP).*

* An International dollar is a currency unit used by economists and international organizations to compare the values of different currencies. It adjusts the value of the U.S. dollar to reflect currency exchange rates, purchasing power parity (PPP), and average commodity prices within each country. According to the World Bank, “An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States.” The international dollar values in this report were calculated from a World Bank table that lists GDP per capita by country based on purchasing power parity and expressed in international dollars.

1.2 THE USE OF LEAD IN PAINT

Paints contain high levels of lead when the paint manufacturer intentionally adds one or more leaded compounds to the paint for some purpose. A paint product may also contain some amount of lead when paint ingredients contaminated with lead are used, or when there is cross-contamination from other product lines in the same factory. Leaded paint ingredients are most commonly intentionally used in solvent-based paint due to their chemical properties, and solvent-based paints have been found to have high lead content in many countries.^[13-15]

The leaded compounds most commonly added to paints are pigments. Pigments are used to give the paint its color, make the paint opaque (so it covers well), and protect the paint and the underlying surface from degradation caused by exposure to sunlight. Lead-based pigments are sometimes used alone, and sometimes used in combination with other pigments.

Leaded compounds also may be added to enamel paints for use as driers (sometimes called drying agents or drying catalysts). Leaded compounds are also sometimes added to paints used on metal surfaces to inhibit rust or corrosion. The most common of these is lead tetroxide, sometimes called red lead or minium.

Non-leaded pigments, driers, and anti-corrosive agents have been widely available for decades, and are used by manufacturers producing the highest quality paints. When a paint manufacturer does not intentionally add lead compounds in the formulation of its paints, and takes care to avoid the use of paint ingredients that are contaminated with lead, the lead content of the paint will be very low—less than 90 parts per million (ppm) lead by dry weight, and frequently down to 10 ppm or less.

Most highly industrial countries adopted laws or regulations to control the lead content of decorative paints beginning in the 1970s and 1980s. Many also imposed controls on the lead content of paints used on toys and for other applications likely to contribute to lead exposure in children. These regulatory actions were taken based on scientific and medical findings that lead paint is a major source of lead exposure in children, and that lead exposure in children causes serious harm, especially to children aged six years and under.

The use of lead in production of decorative paint is prohibited in the European Union through regulations related to safety of consumer products and specific prohibitions for most leaded raw materials. In the U.S., Canada, Australia and other countries with regulations restricting the use of leaded ingredients in decorative paint, standards specifying a maximum lead limit are in place. The

current standard for household paints in e.g., U.S., the Philippines, and India is a total maximum lead content of 90 ppm, and adherence to this ensures that a manufacturer can sell its paint anywhere in the world. Some other countries such as Brazil, South Africa, and Sri Lanka have established standards of 600 ppm total lead.

1.3 PAINT MARKET AND REGULATORY FRAMEWORK IN CAMEROON

As reported in 2015, there is no national statistical data on the paint industry and market share in Cameroon. The only available estimate is based on CREPD's detailed paint market survey conducted in 2011, which indicated that 45 percent of the paints distributed in Cameroon were oil-based paints or enamels, while 38 percent are latex, and 17 percent comprises other types of paints (e.g., synthetic paints). Majority of paints sold in Cameroon are imported from other countries and regions. The percentage breakdown of the sources of paints identified in 2011 are as follows:

- **Cameroon:** 39 percent;
- **UAE, Asia (except China) and Oceania:** 29 percent;
- **European Union:** 14 percent;
- **North Africa:** 10 percent;
- **Other European Countries:** 5 percent;
- **China:** 2 percent;
- **Nigeria:** 0.5 percent; and
- **North America and Latin America:** 0.5 percent.

The source distribution above suggests that paints marketed in Cameroon come from all regions of the world.

The companies with the largest market share include:

- CEP/Seigneurie, a local representation of PPG Industries, Inc. with approximately 50 to 60 percent of the market share;
- Smalto, a local manufacturer previously of Italian investment with about 20 percent market share;
- National Paint, an imported brand manufactured in UAE with about 15 percent of market share; and
- Socipec, a local manufacturer with about 15 percent of the market share.*

* Qualitative information derived from a comprehensive paint market survey undertaken in 2011 by CREPD within the SAICM QSP Lead Paint Elimination Project in Cameroon.

CREPD's brief 2017 market survey covered more than 35 paint retailer outlets and wholesalers distributing solvent-based, enamel decorative and other architectural paints in Yaoundé and Douala, Cameroon, and is slightly different from with the 2015 paint market survey. The results of the 2017 paint market survey showed that paint products from the following brands or manufacturers were not available on various store shelves at the time of visit: CIAC (Cameroon), Colorado (Morocco), Force One (France), International Trust (Tunisia), Littocol (Cameroon), Pelican (Cameroon), and SIMPEX (EU). However, this does not necessarily mean that these paints will not be available for sale on the market again.

The current study also helped identify new paint brands available for sale on the market in Cameroon. Some of the new paint brands in the 2017 study include: Abro (USA), APSCA (Cameroon), Asmaco (UAE), Batilac (Tunisia), Caporouille (Tunisia), Casati (Italy), Contifer (Algeria), Gold Star (Cameroon), Farbe (Italy), Impa Tech (Italy), Prodec (Morocco), Valentine (Tunisia), and Vulcain (Cameroon).

More advocacy and pedagogic work by government and other relevant stakeholders is needed to develop reliable figures on the annual sales of paints and coatings in the country, as well as important statistics such as the percentage of growth of the paint industry, per capita consumption, and per capita consumption compared to other parts of Africa. There is no national statistical data on paint manufacturers and most companies consider their market data to be confidential.

LEAD PAINT REGULATORY FRAMEWORK

Cameroon has no enacted national legal instrument controlling lead in paint. However, a draft regulation is in process. It was initiated in 2012 through a national committee formed by the National Standard Agency (ANOR), which was tasked to establish a national standard that limits lead content of paint. In 2016, an emergency draft regulation on lead in paint setting a total lead limit in all paints to 90 ppm was provisionally adopted by an ad hoc committee including the ministries of Industry, Environment, Health and Trade, as well as representatives of ANOR, paint industry (CEP Seigneurie/PPG Cameroon) and CREPD. The draft regulation was submitted to the Prime Ministry's Office for approval in 2016 before the required final endorsement by the four ministers. As June 2017, this draft regulation is still in the Prime Minister's Office awaiting final approval.

2. MATERIALS AND METHODS

From September 2016 to January 2017, 65 cans of solvent-based paint intended for home use and other applications that can contribute to childhood lead exposure were purchased by CREPD from various stores in Yaoundé and Douala, Cameroon. The sampled paints included 46 decorative paints, 5 of which were aerosol or spray paints, and 19 anticorrosive paints. These paints represented 23 different brands produced by 19 manufacturers.

In most cases, one white paint and one or more bright-colored paint such as red, yellow, orange or green were selected. Additionally, 19 anticorrosive paints for consumer use on furniture and fixtures at homes, schools, and playgrounds were also included in this study. The availability of these paints in retail establishments suggested that they were intended to be used within these environments. Excluded were automotive and industrial paints that are not typically used for domestic housing applications.

During the paint sample preparation, information such as color, brand, manufacturer, country where manufactured, product codes, production dates, and other details as provided on the label of the paint can were recorded. Generic paint colors were recorded, e.g., “yellow” instead of “gold.” For all colored paints, the protocol called for obtaining “bright” or “strong” red and yellow paints when available.

Paint sampling preparation kits containing individually numbered, untreated wood pieces, single-use paintbrushes and stirring utensils made from untreated wood sticks were assembled and shipped to CREPD by the staff of the IPEN partner NGO, Arnika, in The Czech Republic.

Each can of paint was thoroughly stirred and was subsequently applied onto individually numbered triplicates of untreated, labelled wood pieces using different unused, single-use paintbrushes by a researcher of CREPD (Figure 1). Each stirring utensil and paintbrush was used only for the same paint, and extra caution was taken to avoid cross contamination.

For aerosol paints, each canister was vigorously shaken for one to two minutes to ensure that the paint is thoroughly mixed. Several coats of paints were then applied at 10-minute intervals until the coat is thick enough to hide the wood’s structure or fabric, shaking the can between each spray.



Figure 1. Sampling procedures done by CREPD staff include (top) labeling and actual sample preparation; and (bottom) drying of paints on shelves.

All samples were then allowed to dry at room temperature for five to six days. After drying, the painted wood pieces were placed in individually labelled, resealable plastic bags and shipped for analysis of lead content to Forensic Analytical Laboratories, Inc. in the United States of America. The laboratory participates in the Environmental Lead Proficiency Analytical Testing (ELPAT) Program operated by the American Industrial Hygiene Association. In the laboratory selection process, IPEN further assessed the reliability of the laboratory results by conducting an independent quality assurance testing. This was made by sending paint samples with a known lead content to the laboratory, and evaluating the results received.

The laboratory's lower limit of detection for the lead concentration in the paint samples is dependent on the amount of paint in the samples. Generally, the lowest detection limit for the method used is 60 ppm, but if only a small amount of paint is available, the detection limit increases. Therefore, the detection limit was higher (up to 300 ppm) for some of the samples.

The paint samples were analyzed using method EPA3050B/7000B, i.e., through acid digestion of the samples, followed by Flame Atomic Absorption Spectrometry, as recognized by the WHO as appropriate for the purpose.^[16]

3. RESULTS

3.1 SUMMARY OF RESULTS

This study shows that:

- 28 out of 65 of the analyzed solvent-based paints (43 percent of paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight. In addition, 10 paints (15 percent of paints) contained dangerously high lead concentrations above 10,000 ppm. On the other hand, 37 out of 65 solvent-based paints for home use (57 percent of paints), including 22 out of 32 locally manufactured paints (69 percent of paints manufactured in Cameroon) contained lead concentrations at or below 90 ppm, suggesting that the technology to produce paint without lead ingredients exists in Cameroon.
- 13 out of 23 analyzed brands (57 percent of paint brands) sold at least one lead paint, i.e., a paint with lead concentration above 90 ppm. Also, 5 out of 23 analyzed brands (22 percent of paint brands) sold at least one lead paint with dangerously high lead concentrations above 10,000 ppm.
- 25 out of 45 bright-colored paints (56 percent of bright-colored paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight. Yellow paints were the most hazardous with 5 out of 12 paints (42 percent of yellow-colored paints) containing lead concentrations greater than 10,000 ppm; 3 out of 22 red paints (14 percent of red paints), 1 out of 3 orange paints (33 percent of orange paints), and 1 out of 8 green paints (12 percent of green paints) also contained dangerously high lead concentrations above 10,000 ppm.
- For decorative paints, the highest lead concentration detected was 100,000 ppm in a yellow Prodec enamel paint imported from Morocco. For anticorrosive paints, the highest lead concentration detected was 220,000 ppm in an orange Smalto minium (lead tetroxide) paint produced in Cameroon and sold for home use.
- Only 6 out of 65 paints (9 percent of paints) provided information about lead on their labels and most paints carried little information about ingre-

* Fourteen paints (with sample numbers CMR-169, CMR-175, CMR-176, CMR-184, CMR-197, CMR-198, CMR-199, CMR-200, CMR-201, CMR-203, CMR-204, CMR-205, CMR-212, and CMR-218) contained lead concentrations “below 300 ppm,” “below 200 ppm,” or “below 100 ppm.” For this report, these were approximated as “below 90 ppm” in order to compare them to the 90-ppm cut-off limit. It should however be noted that this may lead to an underestimation of the number of paints containing lead concentrations above 90 ppm.

dients. In addition, one paint contained 26,000 ppm lead despite advertisement or claim on its product label that they contain “less than 90 ppm lead.” Most paints were merely labeled as “solvents, pigments and resin,” with no further details on the type of solvents and pigments (organic or inorganic) provided. Most warning symbols on the paint cans indicated the flammability of the paints, but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

3.2 LEAD CONTENT ANALYSIS

28 out of 65 of the analyzed solvent-based paints (43 percent of paints) were lead paints, i.e., contained a lead concentration above 90 ppm –10 of these contained dangerously high lead concentrations above 10,000 ppm (15 percent of paints).

An orange Smalto anticorrosive paint contained the highest concentration of lead at 220,000 ppm, while the lowest concentration of lead less than 60 ppm was detected in 9 paints from the following brands: Casati (yellow); Duco (red); Prodec (white); Smalto (red); Socipec (red); Universal (black, red and white); and Vulcain (black).

The ten solvent-based paints with the highest amounts of lead are summarized in Table 1.

TABLE 1. TOP 10 SOLVENT-BASED PAINTS WITH THE HIGHEST LEAD CONTENT.

Rank	Sample No.	Brand Name	Manufacturer	Color	Lead Content (ppm)
1	CMR-178	Smalto Anticorrosive Paint	Smalto	orange	220,000
2	CMR-163	Prodec Synthetic Enamel Paint	Prodec	yellow	100,000
3	CMR-157	Prodec Synthetic Enamel Paint	Prodec	yellow	54,000
4	CMR-154	Seigneurie Enamel Paint	CEP/PPG	green	47,000
5	CMR-172	Smalto Enamel Paint	Smalto	yellow	30,000
6	CMR-155	Seigneurie Enamel Paint	CEP/PPG	yellow	26,000
7	CMR-167	APSCA Enamel Paint	APSCA	yellow	19,000
8	CMR-168	APSCA Enamel Paint	APSCA	red	17,000
9	CMR-160	Prodec Synthetic Enamel Paint	Prodec	red	16,000
10	CMR-211	Farbe Anticorrosive Paint	Farbe	red	12,000

3.3 PAINT BRAND ANALYSIS

5 out of 23 analyzed brands (22 percent of paint brands) sold at least one paint with dangerously high lead concentration above 10,000 ppm.

Among solvent-based decorative paints, a yellow Prodec enamel paint contained the highest concentration of lead at 100,000 ppm. On the other hand, at least one paint from each of the following brands contained lead below 90 ppm: Abro (orange and yellow); APSCA (white); Asmaco (black, grey and yellow); Casati (green, white and yellow); Duco (blue, green, red and yellow); Farbe (black); Impa Tech (red); National Paint (yellow); Oxirite (grey and red); Prodec (white); Rossignol (red and white); Seigneurie (blue); Smalto (blue, red, white and yellow); Socipec (red); Universal (black, red and white); Valentine (red); and Vulcain (black). This indicates that the technology to produce paints without added lead exists in Cameroon.

Among the 19 anticorrosive paints, an orange Smalto minium paint contained the highest concentration of lead at 220,000 ppm, followed by a red Farbe paint with 12,000 ppm.

Two enamel paints from Seigneurie (Figure 2), a local brand owned by the US-based multinational paint company, PPG Industries, Inc., contained lead concentrations ranging from 26,000 ppm to as high as 47,000 ppm. This finding is not consistent with the statement from PPG Cameroon that they stopped producing lead paint in Cameroon in 2012. One suggested explanation is that empty paint containers from PPG have been refilled with paints of unknown origin to benefit from the reputation of PPG as a manufacturer of non-lead paint. To counter such attempts, recent initiative by PPG Cameroon to call back empty paint containers should include the collection of even these small containers in order to avoid such practices. It should be noted that the two 100 mL containers were from PPG's series of products that do not carry a label stating its lead content directly on the can in the same way other products from the same company do. It would therefore be useful to extend the voluntary labeling initiative to these series of products.

Out of 65 paints, 32 paints were from 10 locally manufactured brands, while 33 paints were from 13 imported brands. Comparison of locally produced brands from imported ones (Table 2) show that 55 percent of paints from imported brands and 31 percent of paints from local brands contained lead concentrations above 90 ppm. Furthermore, 12 percent of imported paints from imported brands and 19 percent of paints from local brands contained dangerously high concentrations of lead above 10,000 ppm.



Figure 2. Two enamel paints from Seigneurie, a local brand owned by the multinational company, PPG Industries Inc., contained dangerously high lead concentrations above 10,000 ppm.

TABLE 2. PERCENTAGE COMPARISON OF LEAD PAINT FROM LOCAL AND IMPORTED BRANDS.

	Local Brands	Imported Brands
Number of Paints	32	33
Percentage of paints with lead > 90 ppm (number of paints)	31 (10)	55 (18)
Percentage of paints with lead ≥ 10,000 ppm (number of paints)	19 (6)	12 (4)
Maximum Concentration, ppm	220,000	100,000

Thirty-six paints from 14 new brands were included in this study. At least one paint from 8 out of 14 new brands (57 percent of new paint brands) contained lead concentrations above 90 ppm, while at least one paint from 3 out of 14 new brands (21 percent of new paint brands) contained dangerously high lead concentrations above 10,000 ppm. On the other hand, at least one paint from 10 out of 14 new brands (71 percent of new brands) contained concentrations

below 90 ppm. The distribution of lead concentrations for new paint brands is shown in Table 3.

TABLE 3. DISTRIBUTION OF LEAD CONCENTRATION BY NEW BRANDS.

New Brand	No. of Samples	No. of Samples Above 90 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Content (ppm)	Maximum Lead Content (ppm)
Abro	2	0	0	< 200	< 300
APSCA	3	2	2	< 200	19,000
Asmaco	3	0	0	< 200	< 300
Batilac	2	2	0	1,100	4,000
Caporouille	2	2	0	2,600	6,000
Casati	4	1	0	< 60	< 200
Contifer	1 (red)	1	0	2,400	2,400
Duco	4	0	0	< 60	< 100
Farbe	2	1	1	70	12,000
Gold Star	2	2	0	2,400	3,200
Impa Tech	1 (red)	0	0	< 70	< 70
Prodec	8	7	3	< 60	100,000
Valentine	1 (red)	0	0	< 80	< 80
Vulcain	1 (black)	0	0	< 60	< 60

3.4 PAINT COLOR ANALYSIS

25 out of 45 bright-colored paints (56 percent of bright-colored paints) such as yellow, red, orange and green contained lead concentrations above 90 ppm, 10 paints of which contained dangerously high lead concentrations above 10,000 ppm (22 percent of bright-colored paints).

This study included 22 red paints, 12 yellow paints, 8 green paints, 7 white paints, 5 blue paints, 4 black paints, 4 grey paints, and 3 orange paints. Yellow, red, orange and green paints contained the highest lead concentrations.

Among bright-colored paints, 6 out of 12 yellow paints (50 percent of yellow paints) contained lead concentrations above 90 ppm, 5 paints of which exceeded more than 10,000 ppm of lead (42 percent of yellow paints); 11 out of 22 red paints (50 percent of red paints) contained lead concentrations above 90 ppm, 3 paints of which exceeded more than 10,000 ppm of lead (14 percent of red paints); 6 out of 8 green paints (75 percent of green paints) contained lead concentrations above 90 ppm, 1 paint of which exceeded more than 10,000 ppm of lead (12 percent of green paints); and 2 out of 3 orange paints (67 percent of orange paints) contained lead concentrations above 90 ppm, 1 paint of which exceeded more than 10,000 ppm of lead (33 percent of orange paints).

The distribution of lead concentration in different colors is shown in Figure 3.

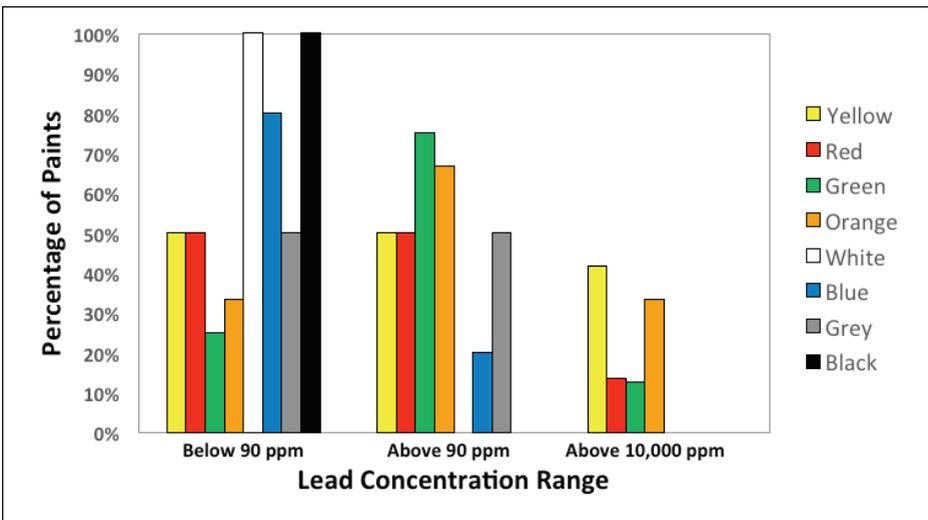


Figure 3. Distribution of Lead Concentrations in Home-Use Solvent-Based Paints by Color.

3.5 LABELING

In general, most paint can labels did not carry meaningful information about lead content or the hazards of lead paint.

Only 6 out of 65 paints (9 percent of paints) provided information about lead on their labels and most paint can labels carried little information about any ingredients. One paint labeled as “minium” contained 220,000 ppm lead (Figure 4). In addition, one paint contained 26,000 ppm lead despite advertisement or claim on its product label that they contain “less than 90 ppm lead.” Most paints were merely labeled as “solvents, pigments and resin,” with no further details on the type of solvents and pigments (organic or inorganic) provided on paint can labels. Manufacturing dates or batch numbers were included on the labels of 26 out of 65 paints (40 percent of paints) included in this study. Most warning symbols on the paint cans indicated the flammability of the paints, but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.



Figure 4. An anticorrosive paint labeled as “minium” containing 220,000 ppm lead is advertised as “quality paint” intended to be used for various applications, including within home environments.”

3.6 COMPARISON WITH RESULTS FROM EARLIER STUDIES

TABLE 4. COMPARISON OF LEAD CONCENTRATION IN NEW SOLVENT-BASED HOME-USE PAINTS FROM CURRENT STUDY WITH EARLIER STUDIES.

	Current Study (2017)	Previous Study (2015)	Previous Study (2011)
Number of Paints	65	47	60
Percentage of paints with lead > 90 ppm (number of paints)	43 (28)	47 (22)	67 (40)
Percentage of paints with lead ≥ 10,000 ppm (number of paints)	15 (10)	17 (8)	25 (15)
Maximum Concentration, ppm	220,000	70,000	500,000

Comparing the three studies undertaken in 2011, 2015 and 2017 (Figure 5) shows a gradual increase of the percentage of paints with lead levels below 90 ppm—from 33 percent in 2011, 53 percent in 2015 to 57 percent in 2017. Also, a slight decrease in the percentage of paints with dangerously high lead levels above 10,000 ppm can be observed (from 25 percent in 2011, 17 percent in 2015 to 15 percent in 2017).

The decrease on the percentage of lead paint available in the market is primarily due to voluntary measures on the part of big individual companies, e.g., CEP/Seigneurie in 2012, after encouragement from CREPD to reformulate their

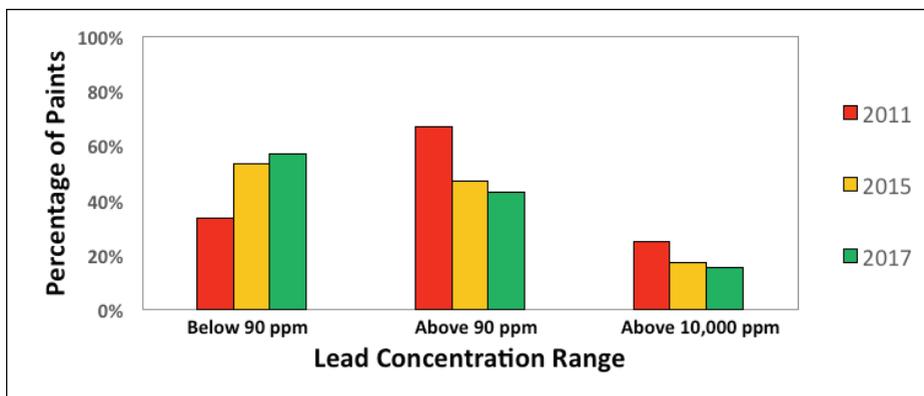


Figure 3. Comparison of three successive paint studies showing a gradual increase on the percentage of paints below 90 ppm, and a consequent decrease on the percentage of paints above 90 and 10,000 ppm.

paint production. With the results of this new study, CREPD hopes to persuade more paint manufacturers to voluntarily transition to lead-free paint production by eliminating the use of lead compounds.

4. CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that solvent-based paints for home use with high concentrations of lead are still widely available in Cameroon since the paints sampled for this study are brands commonly sold in retail stores all over Cameroon. However, a slight improvement over time can be seen and the fact that 37 out of 65 paints (57 percent of paints), including 22 out of 32 locally manufactured paints (69 percent of paints manufactured in Cameroon) contained lead concentrations at or below 90 ppm, indicates that the technology to produce paints without added lead exists in Cameroon. The study results provide a strong justification to adopt and enforce a regulation that will ban the manufacture, import, export, distribution, sale and use of paints with total lead concentrations greater than 90 ppm.

To address the problem of lead in paint, CREPD and IPEN propose the following recommendations:

For the Government of Cameroon through the Office of the Prime Minister to immediately speed up enacting a regulation that will ban the manufacture, import, export, distribution, sale and use of lead paints, i.e., paints that contain total lead concentrations exceeding 90 ppm, the most restrictive standard in the world. They should also require paint companies to display sufficient information indicating toxic content on paint can labels and provide a warning on possible lead dust hazards when distributing painted surfaces. A consumer outline law enacted in 2012 prohibits false trade descriptions and advertisements on consumer products.

For paint companies that still produce lead paints to expeditiously stop the use of leaded paint ingredients in paint formulations. Paint companies should indicate the lead content of their products and provide warnings on lead dust hazards on paint can labels. Retailers should also demand labeled products from paint companies. Paint companies that have shifted to non-lead paint production should get their products certified through independent, third party verification procedures to increase the customer's ability to choose paints with no added lead.

For paint brands holders to request their suppliers to properly label their products and indicate its lead content, as well as warning notifications of lead and lead dust hazards.

For architects, engineers, and construction companies to specify the use of paint products that do not contain lead above 90 ppm for public and private contracts.

For paint consumers to demand paints with no added lead from paint manufacturers, as well as full disclosure of a paint product's content. Household and institutional consumers should ask for, consciously buy, and apply only paints with no added lead in places frequently used by children such as homes, schools, day care centers, parks and playgrounds.

For public health groups, consumer organizations and other concerned entities to support the elimination of lead paint, and conduct activities to inform the public and protect children from lead exposure through lead paint, lead in dust and soil, and other sources of lead.

For all stakeholders to come together and unite in promoting a strong policy that will eliminate lead paint in Cameroon.

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APPENDIX

TABLE 5. SOLVENT-BASED PAINTS FOR HOME USE INCLUDED IN THE STUDY.

Sample No.	Brand	Color	Volume (L)	Price (FCFA)	Date of Manufacture (if given)	Batch No.	Date of Purchase (d/m/y)	Is the website on label?
CMR-154	Seigneurie	green	0.1 kg	1000	None	None	21/09/16	No
CMR-155	Seigneurie	yellow	0.1 kg	1000	None	None	21/09/16	No
CMR-156	Seigneurie	blue	0.1 kg	970	None	None	21/09/16	No
CMR-183	Duco	yellow	1 kg	7050	None	FCM000074	14/09/16	No
CMR-184	Duco	green	1 kg	8150	None	FCM000056	14/09/16	No
CMR-185	Duco	red	1 kg	3350	None	None	14/09/16	No
CMR-218	Duco	blue	1 kg	7050	None	FCM000064	14/09/16	No
CMR-169	Smalto	red	0.1 kg	825	None	None	20/09/16	No
CMR-170	Smalto	green	0.1 kg	825	None	None	20/09/16	No
CMR-171	Smalto	blue	0.1 kg	825	None	None	20/09/16	No
CMR-172	Smalto	yellow	0.1 kg	825	None	None	20/07/16	No
CMR-173	Smalto	red	0.1 kg	825	None	None	20/09/16	No
CMR-174	Smalto	yellow	0.1 kg	1100	None	None	20/01/17	No
CMR-175	Smalto	red	0.1 kg	825	None	None	20/01/17	No
CMR-176	Smalto	blue	1 kg	3825	None	None	20/09/16	No

Sample No.	Brand	Color	Volume (L)	Price (FCFA)	Date of Manufacture (if given)	Batch No.	Date of Purchase (d/m/y)	Is the website on label?
CMR-205	Smalto	white	0.1 kg	850	None	None	31/01/16	No
CMR-177	Smalto (anti-corrosive)	red	1 kg	2500	None	None	26/07/16	No
CMR-178	Smalto (anti-corrosive)	orange	1 kg	2325	None	None	20/07/16	No
CMR-188	Rossignol	red	1 kg	6000	None	None	14/09/16	Rossignol. peintures@gmail.com
CMR-212	Rossignol	white	1 kg	4400	None	151121-C-07	14/09/16	Rossignol. peintures@gmail.com
CMR-186	Universal	white	1 kg	4400	None	None	14/09/16	Universal.cm@gmail.com
CMR-187	Universal	white	1 kg	4400	None	160718-U-01	14/09/16	Universal.cm@gmail.com
CMR-209	Universal (anti-corrosive)	red	1 kg	2000	None	160628-D-01	21/09/16	Universal.cm@gmail.com
CMR-210	Universal (anti-corrosive)	black	1 kg	2500	None	160425-D-03	24/09/16	Universal.cm@gmail.com
CMR-167	APSCA	yellow	0.1 kg	925	None	None	23/01/17	No
CMR-168	APSCA	red	0.1 kg	925	None	None	23/1/17	No
CMR-204	APSCA	white	0.1 kg	925	None	None	31/01/17	No
CMR-191	Gold Star (anti-corrosive)	red	1 kg	1600	None	None	26/07/16	No
CMR-207	Gold Star (anti-corrosive)	red	1 kg	1600	None	None	26/07/16	No
CMR-192	Vulcain (anti-corrosive)	black	1 kg	2350	None	None	20/01/17	No
CMR-194	Farbe (anti-corrosive)	black	1 kg	2450	None	11407027	26/07/16	Farbe@tin.it

Sample No.	Brand	Color	Volume (L)	Price (FCFA)	Date of Manufacture (if given)	Batch No.	Date of Purchase (d/m/y)	Is the website on label?
CMR-211	Farbe (anti-corrosive)	red	1 kg	2500	None	11407097	26/07/16	Farbe@tin.it
CMR-157	Prodec	yellow	0.085 kg	950	None	M3477	21/09/16	www.prodec.com
CMR-158	Prodec	green	0.085 kg	650	None	None	23/01/17	www.prodec.com
CMR-159	Prodec	red	0.085 kg	950	None	M3477	21/09/16	www.prodec.com
CMR-160	Prodec	red	0.085 kg	650	None	M3477	23/01/17	www.prodec.com
CMR-161	Prodec	blue	0.085 kg	950	None	None	21/09/16	www.prodec.com
CMR-162	Prodec	green	0.085 kg	950	None	None	21/09/16	www.prodec.com
CMR-163	Prodec	yellow	0.085 kg	650	None	None	23/01/17	www.prodec.com
CMR-206	Prodec	white	0.085 kg	650	None	None	31/01/17	www.prodec.com
CMR-164	Casati	red	0.1 kg	850	None	607094	23/01/17	No
CMR-165	Casati	yellow	0.1 kg	850	None	607097	23/01/17	No
CMR-166	Casati	green	0.1 kg	850	None	607096	23/01/17	No
CMR-203	Casati	white	0.1 kg	850	None	607093	31/01/17	No
CMR-179	National Paint	grey	1 kg	2875	None	None	20/01/17	www.national-paints.com
CMR-180	National Paint	red	1 kg	2300	None	None	20/09/16	www.national-paints.com
CMR-181	National Paint	green	1 kg	2700	None	None	14/09/16	www.national-paints.com
CMR-182	National Paint	yellow	1 kg	2800	None	484280116	20/09/16	www.national-paints.com
CMR-189	Oxirite (anti-corrosive)	grey	1 kg	4900	None	XZ14402061	19/07/16	www.xylazel.com

Sample No.	Brand	Color	Volume (L)	Price (FCFA)	Date of Manufacture (if given)	Batch No.	Date of Purchase (d/m/y)	Is the website on label?
CMR-190	Oxirite (anti-corrosive)	red	1 kg	4900	None	XZ14401769	19/07/16	www.xylazel.com
CMR-193	Impa Tech (anti-corrosive)	red	0.5 L	2100	None	10107027	20/07/16	No
CMR-197	Abro (spray paint)	orange	0.4 L	1725	None	None	19/07/16	www.abro.com
CMR-199	Abro (spray paint)	yellow	0.4 L	1725	None	None	19/07/16	www.abro.com
CMR-198	Asmaco (spray paint)	grey	0.4 L	1250	None	6291100713011	19/07/16	No
CMR-200	Asmaco (spray paint)	black	0.4 L	1250	None	6291100713011	19/07/16	No
CMR-201	Asmaco (spray paint)	yellow	0.4 L	1250	None	None	19/07/16	No
CMR-195	Batillac	green	1 kg	3000	None	X1228401	20/07/16	www.peintures-valentine.com
CMR-213	Batillac	yellow	1 kg	3000	None	None	20/07/16	www.peintures-valentine.com
CMR-196	Caporouille (anti-corrosive)	orange	1 kg	3000	None	X933502	26/07/16	www.peintures-valentine.com
CMR-215	Caporouille (anti-corrosive)	grey	1 kg	3320	None	X1226306	26/07/16	www.peintures-valentine.com
CMR-214	Valentine (anti-corrosive)	red	1 kg	2025	None	None	26/07/16	No
CMR-202	Socipec (anti-corrosive)	red	1 kg	2450	None	None	20/09/16	No
CMR-208	Ritver (anti-corrosive)	red	0.9 L	2000	None	1503-1022	26/09/16	www.ritver.com
CMR-216	Contifer Anti-corrosiv	red	1 kg	2200	None	None	21/09/16	No
CMR-217	Ferox (anti-corrosive)	red	1 kg	1960	None	None	21/09/16	No

TABLE 6. RESULTS OF LABORATORY ANALYSIS OF SOLVENT-BASED PAINTS FOR HOME USE.

Sample No.	Brand	Color	Lead Content, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CMR-154	Seigneurie	green	47,000	USA	Cameroon	No
CMR-155	Seigneurie	yellow	26,000	USA	Cameroon	Yes. "Less than 90 ppm lead"
CMR-156	Seigneurie	blue	90	USA	Cameroon	Yes. "Less than 90 ppm lead"
CMR-183	Duco	yellow	< 90	USA	Cameroon	No
CMR-184	Duco	green	< 100	USA	Cameroon	No
CMR-185	Duco	red	< 60	USA	Cameroon	Yes. "Less than 90 ppm lead"
CMR-218	Duco	blue	< 100	USA	Cameroon	No
CMR-169	Smalto	red	< 100	Cameroon	Cameroon	No
CMR-170	Smalto	green	5,500	Cameroon	Cameroon	No
CMR-171	Smalto	blue	< 90	Cameroon	Cameroon	No
CMR-172	Smalto	yellow	30,000	Cameroon	Cameroon	No
CMR-173	Smalto	red	< 60	Cameroon	Cameroon	No
CMR-174	Smalto	yellow	< 90	Cameroon	Cameroon	No
CMR-175	Smalto	red	< 100	Cameroon	Cameroon	No
CMR-176	Smalto	blue	< 200	Cameroon	Cameroon	No
CMR-205	Smalto	white	< 200	Cameroon	Cameroon	No
CMR-177	Smalto (anticorrosive)	red	< 80	Cameroon	Cameroon	No
CMR-178	Smalto (anticorrosive)	orange	220,000	Cameroon	Cameroon	Yes. "Minium"
CMR-188	Rossignol	red	< 80	Cameroon	Cameroon	No
CMR-212	Rossignol	white	< 100	Cameroon	Cameroon	No
CMR-186	Universal	white	< 70	Cameroon	Cameroon	No
CMR-187	Universal	white	< 60	Cameroon	Cameroon	No

Sample No.	Brand	Color	Lead Content, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CMR-209	Universal (anticorrosive)	red	< 60	Cameroon	Cameroon	Yes. "Less than 90 ppm lead"
CMR-210	Universal (anticorrosive)	black	< 60	Cameroon	Cameroon	No
CMR-167	APSCA	yellow	19,000	Cameroon	Cameroon	No
CMR-168	APSCA	red	17,000	Cameroon	Cameroon	No
CMR-204	APSCA	white	< 200	Cameroon	Cameroon	No
CMR-191	Gold Star (anticorrosive)	red	3,200	Cameroon	Cameroon	No
CMR-207	Gold Star (anticorrosive)	red	2,400	Cameroon	Cameroon	No
CMR-192	Vulcain (anticorrosive)	black	< 60	Cameroon	Cameroon	No
CMR-194	Farbe (anticorrosive)	black	70	Italy	Cameroon	No
CMR-211	Farbe (anticorrosive)	red	12,000	Italy	Cameroon	No
CMR-157	Prodec	yellow	54,000	Morocco	Morocco	No
CMR-158	Prodec	green	9,000	Morocco	Morocco	No
CMR-159	Prodec	red	890	Morocco	Morocco	No
CMR-160	Prodec	red	16,000	Morocco	Morocco	No
CMR-161	Prodec	blue	590	Morocco	Morocco	No
CMR-162	Prodec	green	6,500	Morocco	Morocco	No
CMR-163	Prodec	yellow	100,000	Morocco	Morocco	No
CMR-206	Prodec	white	< 60	Morocco	Morocco	No
CMR-164	Casati	red	100	Italy	Italy	No
CMR-165	Casati	yellow	< 60	Italy	Italy	No
CMR-166	Casati	green	< 70	Italy	Italy	No
CMR-203	Casati	white	< 200	Italy	Italy	No
CMR-179	National Paint	grey	800	UAE	UAE	No
CMR-180	National Paint	red	9,900	UAE	UAE	No

Sample No.	Brand	Color	Lead Content, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CMR-181	National Paint	green	6,600	UAE	UAE	No
CMR-182	National Paint	yellow	< 70	UAE	UAE	No
CMR-189	Oxirite (anticorrosive)	grey	< 80	Spain	Spain	No
CMR-190	Oxirite (anticorrosive)	red	< 70	Spain	Spain	No
CMR-193	Impa Tech (anticorrosive)	red	< 70	Italy	Italy	No
CMR-197	Abro (spray paint)	orange	< 200	USA	USA	No
CMR-199	Abro (spray paint)	yellow	< 300	USA	USA	No
CMR-198	Asmaco (spray paint)	grey	< 200	UAE	UAE	No
CMR-200	Asmaco (spray paint)	black	< 300	UAE	UAE	No
CMR-201	Asmaco (spray paint)	yellow	< 200	UAE	UAE	No
CMR-195	Batilac	green	1,100	Tunisia	Tunisia	No
CMR-213	Batilac	yellow	4,000	Tunisia	Tunisia	No
CMR-196	Caporouille (anticorrosive)	orange	6,000	Tunisia	Tunisia	No
CMR-215	Caporouille (anticorrosive)	grey	2,600	Tunisia	Tunisia	No
CMR-214	Valentine (anticorrosive)	red	< 80	Tunisia	Tunisia	No
CMR-202	Socipec (anticorrosive)	red	< 60	Cameroon	Cameroon	No
CMR-208	Ritver (anticorrosive)	red	1,300	UAE	UAE	No
CMR-216	Contifer (anticorrosive)	red	2,400	Algeria	Algeria	No
CMR-217	Ferox (anticorrosive)	red	720	Cameroon	Cameroon	Yes. "Lead minium"

TABLE 7. DISTRIBUTION OF LEAD CONCENTRATION BY BRAND.

Brand	No. of Samples	No. of Samples Above 90 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Content (ppm)	Maximum Lead Content (ppm)
Abro	2	0	0	< 200	< 300
APSCA	3	2	2	< 200	19,000
Asmaco	3	0	0	< 200	< 300
Batilac	2	2	0	1,100	4,000
Caporouille	2	2	0	2,600	6,000
Casati	4	1	0	< 60	< 200
Contifer	1 (red)	1	0	2,400	2,400
Duco	4	0	0	< 60	< 100
Farbe	2	1	1	70	12,000
Ferox	1 (red)	1	0	720	720
Gold Star	2	2	0	2,400	3,200
Impa Tech	1 (red)	0	0	< 70	< 70
National Paint	4	3	0	< 70	9,900
Oxirite	2	0	0	< 70	< 80
Prodec	8	7	3	< 60	100,000
Ritver	1 (red)	1	0	1,300	1,300
Rosignol	2	0	0	< 80	< 100
Seigneurie	3	2	2	90	47,000
Smalto	11	3	2	< 60	220,000
Socipec	1 (red)	0	0	< 60	< 60
Universal	4	0	0	< 60	< 70
Valentine	1 (red)	0	0	< 80	< 80
Vulcain	1 (black)	0	0	< 60	< 60

TABLE 8. DISTRIBUTION OF LEAD CONCENTRATION BY COLOR.

Color	No. of Samples	No. of Samples Above 90 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Content (ppm)	Maximum Lead Content (ppm)
White	7	0	0	< 60	< 200
Yellow	12	6	5	< 60	100,000
Orange	3	2	1	< 200	220,000
Red	22	11	3	< 60	17,000
Green	8	6	1	< 70	47,000
Blue	5	1	0	< 90	590
Black	4	0	0	< 60	< 300
Grey	4	2	0	< 60	2,600



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