

1. Priority Product Information

1. Brand Names and/or Product Names	***
2. Products in Which Priority Product is Used	Paint strippers and paint removal products
3. Chemical of Concern	Methylene chloride / dichloromethane (CASRN 75-09-2)
4. Material Safety Data Sheet Reference	****

*** This is a model assessment and not tied to any real or specific company or product. This information is not provided in this model assessment.

1.1 Product Functional Requirements

Paint stripping products on the market today are used to clean surfaces by removing surface coatings, including paint, lacquers, varnishes, or graffiti from various substrates. These substrates are most often metal and wood, and in the case of graffiti, also concrete. These products, referred to hereafter as “paint strippers,” are often used to remove old, blistered, or cracked paint to “clean” and ready the substrate for an application of coatings such as fresh paint. There are generally three categories of paint stripper use: consumer, professional, and industrial.¹

Consumer: Paint strippers are used for a variety of “do-it-yourself” (DIY) home-improvement or household purposes or hobbies. Uses include stripping painted or varnished wood or metal furniture, kitchen cabinets, door and window jambs, and metal bathtubs (among other items). Paint strippers are also used on recreational boats or water craft. Use occurs both indoors and outdoors. Paint strippers are most often purchased in small quantities at paint or hardware supply stores.

Professional: Hired contractors and trades workers use paint strippers to remove paint from exterior and interior walls; to remove graffiti from wood, brick, or concrete structures; to remove paint from wooden doors, window frames, and other wooden building features such as banisters, hand rails, stairs, and floors; and to remove paint from metal bathtubs. Contractors also use paint strippers in marine settings to remove paint on boats and boating equipment. Paint strippers used by professionals are often purchased at paint or hardware supply stores or professional supply outlets.

Industrial: Industrial facilities using paint strippers at their onsite facilities often require the use of specialized and/or industrial scale equipment, such as immersion tanks. Paint strippers used in industrial applications include use in metal stripping, furniture stripping, automotive stripping (including part stripping), ship

stripping, and aircraft stripping. Paint strippers used by industrial facilities are typically used in large volumes and purchased through industrial distributors.

The category of paint strippers that is the subject of this alternatives analysis includes both consumer and professional uses. These uses include products readily purchased at consumer retail outlets, including paint and hardware supply stores. Industrial uses of paint strippers are considered beyond the scope of this analysis given that these are not consumer products. While it is possible for consumers to obtain industrial paint strippers, these products are not directly marketed to consumers, nor are these industrial products available in consumer retail outlets.

1.2 Chemical of Concern Functional Requirements

The chemical of concern in paint strippers is methylene chloride (CASRN 75-09-2). Paint provides a protective coating and is designed to be environmentally robust and difficult to remove. Methylene chloride is the primary stripping solvent.

During professional and consumer use of methylene chloride-based paint strippers, the product is typically brushed onto the substrate; the stripper then softens or dissolves the paint or varnish coating, and the resulting substrate-stripper mixture is then scraped off. The substrate may need to be washed off after stripping to eliminate any residue left on the surface.

Methylene chloride in paint strippers functions through a combination of processes that involve penetrating the paint layers and breaking the bond between the paint and the substrate.² As methylene chloride volatilizes it pushes up on the resulting painted film, tenting it away from the substrate, and making the paint easy to remove with a blunt metal surface such as a putty knife. The most important function of a solvent in a paint stripper is its diffusivity.³

Other primary functions include causing the target paint to swell and delivering activators to the interfaces of paints and substrates.⁴

To enhance the solvency function and performance of methylene chloride in paint strippers, product formulations routinely contain additional chemicals that perform the following functions:⁵

- co-solvents to improve the efficiency of stripping or to diminish the cost of the product without compromising the product's performance,
- activators that are involved in breaking the bond between paints and substrates,
- evaporation inhibitors to reduce evaporation of the solvent and increase time in contact with the substrate,
- thickeners to increase the viscosity of the product which is important for use on vertical surfaces,
- corrosion inhibitors used to ensure the stability of the stripper in its packaging or to protect the substrate,
- surfactants added so products and brushes used during applications can be rinsed with water,
- colorants, and/or
- water.

1.3 Performance Requirements

Paint strippers have two general performance requirements: (1) effective removal of surface coatings and (2) maintenance of the quality and integrity of the substrate surface. For example, the removal of paint from wooden substrates using chemical paint strippers can increase surface roughness while the removal from metal substrates can cause pitting and rusting.

The American Society for Testing and Materials (ASTM) published a standard (D6189-97) relevant to testing the effectiveness of chemical paint removers for organic coatings on wood and metal.⁶ Performance factors considered include:

- compatibility with the substrate;
- effectiveness in removing a variety of paint or coating types (e.g., latex enamel, polyurethane, varnish, shellac, nitrocellulose lacquer, etc.); and
- stripping time.

The performance requirements based on the above three factors are application-specific and will vary. The two performance metrics included in the ASTM D6189-97 testing standard include:

- amount (percentage ranking) of each layer of coating removed based on specified stripping times; and
- condition (qualitative ranking) of substrate after coating removal.

Green Seal's GS52 standard for household cleaning products includes a standard for graffiti removal that is based on testing the performance of alternative products. The primary performance metric is that "the product shall demonstrate that it performs equivalent to or better than a national market-leading product in its category, compared at the most dilute/least concentrated manufacturer recommended dilution level for routine cleaning, using an objective, scientifically-validated method, conducted under controlled and reproducible laboratory conditions."⁷

1.4 Legal Requirements

There are no legal requirements for the performance of paint strippers for consumer or professional use.

1.5 Role of Chemical of Concern in Meeting Product Requirements

The role of methylene chloride, the chemical of concern, is to provide the primary function of paint or coating removal as reviewed above in Section 1.2. Either the chemical of concern or an alternative is necessary to meet the product's functional requirements. Therefore, it is required that alternatives be identified and evaluated according to the relevant comparison factors.