

# Methyl Methacrylate Monomers

## **INTRODUCTION**

Periodically, the Nail Manufacturers Council (NMC) publishes educational updates for nail professionals to keep them informed about current trends. This particular update focuses on the issues related to use of artificial nail enhancement products based on methyl methacrylate monomer (MMA).

### **METHYL METHACRYLATE LIQUID MONOMERS**

In the infancy of the professional nail industry, nail enhancement products depended largely on methyl methacrylate (MMA) monomer as their main ingredient. These products were often referred to as "dental acrylics" or "porcelain nails". By the mid-1970s, the FDA had received enough complaints related to the use of MMA that it was forced to take action against several manufacturers of these products.

The chief complaints ranged from skin allergy to loss of sensation in the fingertips to permanent loss of the nail plate, usually the result of repeatedly exposing the client's soft tissue to the monomer liquid. Since MMA products have poor adhesion to the natural nail plate<sup>1</sup>, nail technicians were forced to vigorously "rough up the nail" surface with coarse grit abrasive files and heavy-handed pressure in order to ensure acceptable adhesion. This irresponsible practice thins, weakens and damages the natural nail plate.

The FDA warned manufacturers that further use of MMA monomer liquid in artificial nail enhancement products was "inappropriate" and continues to threaten legal action to this day. Presently thirty U.S. states and Canada have prohibited the use of MMA monomer in nail enhancement products. The Cosmetic Ingredient Review expert panel (CIR) was asked to review MMA for safety, but would not do so because the monomer was prohibited by FDA and it is not listed or categorized as a cosmetic ingredient<sup>2</sup>.

MMA monomer is used widely around the world in many applications ranging from dental prosthetics to contact lenses to bone cements. Therefore the effect of exposure to humans is well understood. MMA is not considered to be a cancer-causing agent nor does it damage unborn fetuses. These are myths and not the real reasons to avoid MMA. What are the reasons? Other than the FDA's stated position to avoid using MMA monomer in artificial nail products:

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<sup>1</sup> Data provided to the CIR, October 2001 by Doug Schoon, CND, Inc.

<sup>2</sup> Cosmetic Ingredient Review Announcement June 10, 2003.

1. MMA nail products do not adhere well to the nail plate. To make these products adhere, nail technicians must shred the surface of the nail plate with a coarse grit abrasive file, causing thinning and weakening. This is not the case with traditional products which are designed to adhere to the natural nail plate.
2. MMA creates the hardest and most rigid nail enhancements, which makes them very difficult to break. When jammed or caught, the overly filed and thinned natural nail plate often breaks before the MMA enhancement, leading to serious nail damage and possible subsequent bacterial infection.
3. MMA is extremely difficult to remove once adhered to the nail plate. Since it does not dissolve in product removers, it is usually pried from the nail plate, creating still more damage to the overly thinned nail plate.
4. Nail professionals who use these low-cost, gray market products are often uneducated in the proper procedures of correct nail plate preparation, controlled product application, proper maintenance and safe removal. They often use unsafe practices, work in unsanitary conditions, and receive no continuing education in their profession.

Serious adverse skin reactions and permanent nail deformities are only part of the risk of using MMA. Nail technicians may be found legally liable if they knowingly use products containing MMA monomer liquid. In many states they may lose their professional licenses, be subject to criminal penalties and fines, and/or be sued by injured clients.

### **METHYL METHACRYLATE POLYMER POWDERS**

Nail technicians who are aware of the dangers of MMA monomer are often confused because many acrylic powders contain "methyl methacrylate". The solid form of MMA is called PMMA (poly methyl methacrylate) and has a completely different chemical structure, as well as very different properties. It is not extremely difficult to remove, it does not make an overly hard and rigid nail, and it does not require roughing up of the nail plate. PMMA is also safely used to create common products such as Plexiglas™ and Lucite™.

### **ETHYL METHACRYLATE LIQUID MONOMER**

Responsible manufacturers formulate their liquid monomers with ethyl methacrylate (EMA). The nail industry has had considerable experience with EMA and the CIR has twice declared it " safe as used " by trained nail professionals, with their only expressed concern being for nail professionals to be taught to prevent skin exposure, the major

cause of adverse skin reactions. The CIR cited three consumer studies pertaining to adverse reactions to finished products in their safety assessment. These results are:<sup>3</sup>

□	2.9	adverse reactions per 1,000,000 units sold	(Retail sales/RNA)
□	2.07	"	" (FDA data)
□	3.2	"	" (Professional sales/NMC)

The first value was submitted to the CIR by the Retail Nail Association (RNA), the second value is from the FDA database and the third was compiled by the NMC, based on information provided by manufacturers. Each was considered low by cosmetic standards, but the CIR felt the values could be further minimized through education related to correct product usage.

## **HOW CAN I TELL?**

Since MMA is prohibited, you are unlikely to find it on the ingredient label. Still it is usually not difficult to tell if a product contains MMA. Here are three simple things to watch for:

1. Unusually strong or strange odor that doesn't smell like other acrylic liquids.
2. Nail enhancements that are extremely hard and difficult to file.
3. Acrylic nail enhancements that require more than an hour to soak off in solvents designed to remove artificial nails in 30 minutes or less.

Discount pricing may also be an indicator of MMA usage since MMA cost several times less than EMA.

## **THE NMC'S RECOMMENDATION**

The Nail Manufacturers Council agrees with the FDA that the use of liquid nail enhancement products containing MMA is unsafe and unwise. Anyone who manufactures, sells or distributes these potentially dangerous substances is breaking the law, endangering the health and safety of your clients and endangering the entire nail profession, because clients who are injured by MMA may be lost to the industry forever. For all of the reasons listed in this update, the NMC recommends to nail professionals everywhere to avoid the use of MMA-containing artificial nail enhancement monomers.

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<sup>3</sup>

Ethyl Methacrylate Amended Final Report, International Journal of Toxicology, 21 (Suppl. 1) 2002.