

# **Chemical & Scientific Advancements In The Beauty & Nail Enhancement Industry.**

Shana Cromwell- Ramnarain  
Business & Technology of Fashion  
New York City College of Technology  
Dr. Denise Sutton  
April 2023

The beauty industry is a historically wide industry that touches many professions. The nail enhancement industry is a subcategory of the beauty industry, enhancing, lengthening and protecting a woman's natural nails with chemical enhancements. The nail industry is no different from the changes subject to the beauty industry as a whole, as cosmetics have changed, new technologies have been invented in order to adjust and improve formulas, provide better results and overall improve the product that's being sold to consumers and for consumer health. In modern day, the nail enhancement industries have many options, artists & business options and services available to women anywhere in the world. The nail enhancement industry was a fairly new industry that was introduced in the 1950's, but didn't necessarily start in a legal or healthy way.

The nail industry at first was based only on use of nail lacquers, enamels and polishes. These were all very lightweight chemical colorings for the natural nail that can be taken off easily with acetone-based remover. This was the era of the natural nail, when enhancements weren't invented quite as yet, and a short natural nail was seen on what was considered a "good, productive woman" in the 1950s (Madvedev 2011). Acrylic enhancements created for stronger and longer nails have their origins in the dental industry as surprising as this may seem. Many professionals in the dental industry utilized the same chemicals that are used in the nail enhancement industry. This includes *methyl* methacrylate as well as *ethyl* methacrylate powder. Although the difference in these two chemicals is only one letter, any scientist would know that this single letter makes the utmost difference in the composition of chemical structure in these nail and teeth enhancement products.

The development of acrylics in the nail industry can be traced back to the 1950s, when MMA was first introduced as a material for dental implants. Its use in the nail industry began in

the 1970s, when Dr. Fred Slack, a practicing dentist, broke his nail in the laboratory and attempted to fix it with a dental implant material called methyl methacrylate. This chemical comes in a powder form and needs to be mixed with a liquid *monomer* as a solidifying agent in order to create a clay like substance that hardens in a matter of seconds. Once Dr. Slack realized his discoveries' potential, this method of enhancement became wildly popular in the nail industry; aiding those who had weak and broken nails. In the late 1970s, as methyl methacrylate (MMA) use became wildly popular in the nail industry, health concerns became prevalent in American salons. The FDA was alerted after a while, as MMA is a poisonous chemical created with intent to be used only in a safe lab setting. Methyl methacrylate teeth implants were only implanted into the patient once the clay had thoroughly hardened, not in its liquid state. Methyl methacrylate when wet or in its liquid form, is extremely harmful and toxic to the human skin and nail matrix (location of nail growth origin) (Zhong 2019).

After a series of crackdowns by the FDA, MMA was declared a toxic chemical unsafe for human use in the nail industry and abruptly banned from use. However, later in the 1970s, another dentist, Dr. Stuart Nordstrom created the first acrylic liquid and powder formula with *ethyl* methacrylic instead of *methyl* methacrylic (Palvolic 2018). The small chemical change in this structure made the liquid form of this acrylic safe to use on human fingernails. Although, in modern practices it is advised to minimize contact with the skin and these chemicals as allergies can form, EMA became the safe choice to use for nail enhancement. EMA has similar properties to MMA but is less toxic and easier to work with. EMA is also more flexible than MMA, which makes it a better choice for nail enhancements. Today, most nail salons use EMA for artificial nails instead of MMA. In recent years, the nail industry has continued to advance with new developments in technology and materials. One of the most exciting developments is the use of

3D printing to create custom nail designs, stamping plates, the creation of gel Polish and UV/LED lamp as well as many new nail enhancement services and choices such as polygel, gel-X and soft gel overlays.

The nail industry has been greatly influenced by scientific advances, particularly in the development of acrylic materials such as MMA and EMA. While MMA was initially popular due to its strength and durability, concerns about its toxicity led to the development of EMA, which is now the preferred material for artificial nails. The industry continues to advance with new developments in technology and materials, but concerns about safety remain a hot topic of conversation in the nail industry. Chemical formula changes have affected beauty practices throughout the years, but the chemicals used in the nail industry are also linked to the dental industry and provide much more information than we ever thought existed about the origin of nail enhancements and its scientific evolution.

## References

Medvedev, K. (2011). The cold war, fashion, and resistance in 1950s Hungary. *Comparative Hungarian Cultural Studies*, 209-219.

Pavlovic, L. (2018). The science of UV curing nail gels: A short review. In *Proceedings RADTECH International North America Conference*.

Zhong, L., Batterman, S., & Milando, C. W. (2019). VOC sources and exposures in nail salons: a pilot study in Michigan, USA. *International archives of occupational and environmental health*, 92, 141-153.