

SIX-PART SERIES EXCERPTED

NAIL STRUCTURE & PRODUCT CHEMISTRY

PERFORMANCE THROUGH CONSISTENCY CONTROL

Consistency is determined by the amount of polymer powder blended with monomer liquid. Consistency is also called the mix ratio. It's not possible to create a monomer liquid that can be used at any mix ratio. If the proper consistency is used, the nail enhancement will contain the correct amount of polymer powder. For non-odourless products (those based on EMA), the enhancement will contain between 30 and 40% polymer powder, depending on the mix ratio used. The polymer powder has other dramatic effects on the artificial nail enhancement's performance. The powder actually gives the enhancement much of its durability. Figure 9-2 A & B show a magnified view of monomer and polymer at both correct and incorrect ratios. When the monomer polymerises, it completely surrounds each tiny bead. The polymer beads act like tiny crack arrestors, blocking cracks from spreading. The importance of the powder shouldn't be underestimated. Polymer powders greatly reinforce the entire enhancement. In a nutshell: too little polymer powder will mean the enhancement contains too few crack arrestors and therefore will have less reinforcement and lower toughness. Cracks will grow and spread more easily if the enhancement contains too little powder.

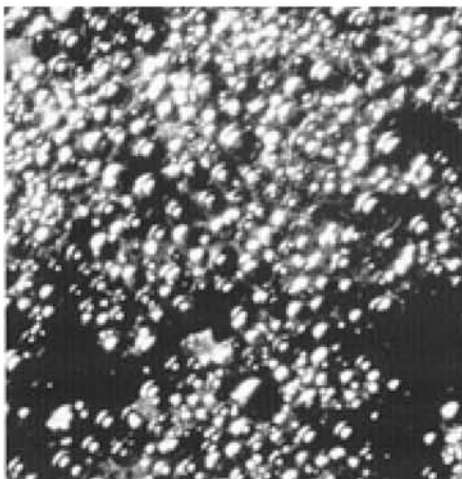


FIGURE 9.2 A – INCORRECT CONSISTENCY

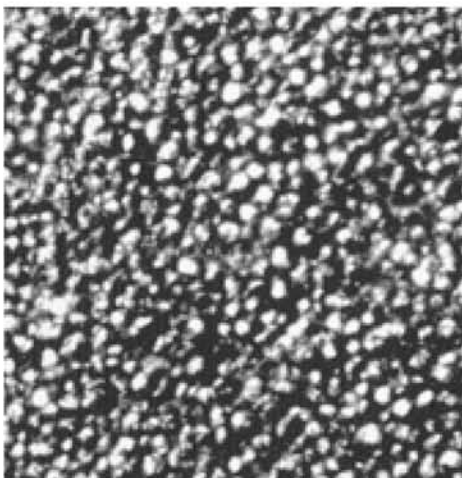


FIGURE 9.2 B – CORRECT CONSISTENCY

Incorrect ratios of monomer-to-polymer create voids where no polymer can be found. The monomer-rich areas show up as black spaces in this highly magnified view. Figure A shows a bead with too wet a consistency and the bead in figure B has the correct consistency. Nail techs sometimes add extra monomer liquid to smooth the enhancement surface, not realising that this alters the mix ratio, reducing durability and colour stability and possibly leading to excessive breakage. The greatest enhancement durability is obtained when using the correct ratio of monomer liquid to polymer powder. Table 9-2 shows laboratory data that demonstrates the toughness of enhancements at different mix ratios. You can see too much monomer liquid or too much polymer powder can lower the enhancement's toughness. Achieving the correct ratio takes practice, but the rewards are great! Clients will be happier and need fewer repairs. Techniques for achieving proper mix ratios will be discussed in the next section.

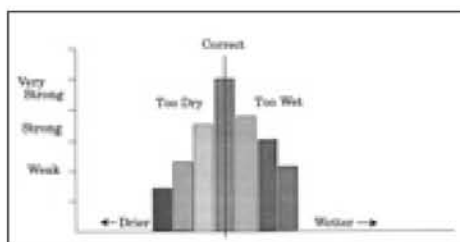


TABLE 9.2 – TOUGHNESS OF ARTIFICIAL NAIL ENHANCEMENTS AT VARYING MIX RATIOS

BE A CONTROL FREAK

Controlling product consistency is an extremely important part of being a nail professional. Product or bead consistency is determined by the ratio of monomer liquid to polymer powder. Extra amounts of monomer will create a wetter bead consistency. A drier bead is made by increasing the amount of polymer powder. Improper consistency is the number one reason techs fail when using these products. The correct ratio of monomer liquid to polymer powder must be used. Too dry a consistency causes breakage and lifting, but too wet is worse. If you use too much monomer liquid, the enhancements may seem strong and flexible and will adhere well to the nail plate, but don't be fooled – all is not well! Too wet a consistency is one of the leading causes of allergic reaction in clients and techs. Also, using the improper consistency causes enhancements to lose their durability.

BEAD CONSISTENCIES ALTER BY CHANGING THE RATIO OF MONOMER LIQUID TO POLYMER POWDER

Wet consistency – 2 parts monomer to 1 part polymer

Medium-wet consistency – 1 1/12 parts monomer to 1 part polymer

Dry consistency – 1 part monomer to 1 part polymer

TABLE 9.3

BRRR . . . IT'S COLD IN HERE

Fast-setting liquid/powder enhancement products aren't just for veteran nail techs with a need for speed. They're actually more suitable for cold, drafty salons. Fast-setting liquid and powders contain more initiator and/or catalyst, so they'll set up twice as fast as products with standard set times. The shorter set times will occur no matter what the salon temperature – cold, medium, or warm. These faster-setting products will set up at just the right speed in colder salons, but in warm salons they can be blazingly fast – sometimes too fast for novice techs. Using a wetter bead slows down set time, but this will make the consistency too wet and can lead to allergic reactions and/or service breakdown. Nail techs who complain that a fast-setting product isn't all that fast are probably working with much too wet a mix ratio. Caution: Don't be tempted to use a wetter mix ratio to slow down fast-setting products. Instead, switch back to a standard-setting product. Fast-setting products aren't for everyone or all salons, but those who use them must use them correctly.

Wet consistencies may improve adhesion, but they lower the enhancement's overall durability. This is because the artificial nail contains less polymer powder. Recall that the polymer powder improves toughness and prevents cracks from spreading through the enhancement. So using the right amount of powder is important. Using too wet a consistency can mean big trouble in other ways as well. Wet consistencies can also lead to cracking and lifting. Table 9-3 shows that dry consistencies have equal amounts of monomer liquid and polymer powder. The extra powder offers improved durability but lowers adhesion, because adhesion comes from the monomer liquid. Medium consistencies give the best of both worlds. Medium-consistency enhancements are tough, durable and flexible and have good adhesion to the natural nail. How can you know if the mix ratio is correct? Here's an easy way to determine the proper consistency for L&P products –

- 1 – Use a clean brush to make a normal bead.
- 2 – Carefully lay the bead on top of a clean, unfilled artificial nail tip, placing it directly over the centre or apex of the tip. Do not pat or push down on the bead.
- 3 – Watch the bead for 10 seconds and carefully note what you see. Determine which of the following best matches your observations:
 - Does the bead begin to settle and flow out almost immediately?
 - Does the height of the bead drop halfway or more within 10 seconds?
 - Does the bead seem to lose most of its original shape?
 - Can you see a ring of excess liquid around the base of the bead?
 - Would this bead be difficult to control or would it flow into the skin surrounding the nail plate?

FROM THE SECOND EDITION OF

BY DOUG SCHOON PART 4

If you answered yes to any of the questions above, your bead is probably a wet consistency. If you answered yes to all of these questions, your ratio is probably 3-parts liquid to 1-part powder (or more). If this is the case, you are using the product incorrectly. Nail enhancements made with excessively wet mix ratios are prone to develop tiny stress fractures, cracks and lifting near the cuticle area or sidewalls. Also, discoloration becomes more likely, and there will be an increased chance of developing an allergic reaction.

- Does the bead melt out fairly slowly and have a 'frosted glass' appearance?
- After 10 seconds, does the bead hold a smooth, dome-like shape?
- Does the overall height of the dome drop only $\frac{1}{4}$ of the original height?
- Does all of the liquid stay in the bead without a ring of excess liquid around the base?
- Is the bead easy to control and does it retain its shape once it's placed?

If you answered yes to all the questions, you're probably using a medium mixture, so good for you! Make sure you always stick to this procedure. You'll be much less likely to have problems.

- Does the bead hold its original shape and/or melt out very little?
- Does the bead's height and shape remain unchanged after 10 seconds?
- Does the bead look lumpy or have a crusty appearance?
- Is the bead difficult to control and shape into place?

If you answered yes to any of these questions, you're probably using too dry a bead. Only odourless products require techs to use dry mix ratios for durability, as well as to lower the risk of developing allergic reactions. But a dry mix ratio can cause non-odourless products to undergo massive lifting as well as brittleness and discoloration.

Techs are often fooled into using a wet consistency. They mistakenly believe there are advantages to this practice. For instance, using wetter consistencies is a quick way to make the surface smooth. But it causes far more problems than it solves. A high-quality enhancement product performs best at medium ratios. Remember:-

- Never go back and smooth the surface with more monomer.
- Never use pure monomer to clean around the edges or under the nail or sidewalls.
- Never touch any monomer to the skin (including gels and wraps).
- Avoid using overly large brushes for product application.

WHEN SEASONS' CHANGE

Check your mix ratio each time the seasons' change. It may sound strange, but it makes sense. When it's colder, your monomer liquid will also be colder. Just as cold water dissolves less sugar than hot water, cool monomer picks up less powder than warm monomer. So, recalibrate your mix ratio whenever temperatures rise or fall to make sure you stay in the proper range.

Using an overly large brush can throw off the mix ratio. How? Large brushes hold a considerable amount of liquid monomer. If this excess liquid is pressed from the belly of the brush into the enhancement, the mix ratio could become too wet. Very large brushes don't save time. And they increase the risk of allergy in two ways, both by creating overly wet beads, with too much monomer, and by increasing the risk of skin contact with monomer liquid. It is very difficult to keep the edges of an overly large brush from touching living skin. Using smaller brushes improves the quality of the enhancement as well as helping protect sensitive clients from developing allergies. As you'll see in following chapters, many problems can be related to using monomer liquids improperly. Don't fall into these traps. These bad habits are ghosts from the early years of the nail industry when there was no proper education. Don't be a victim of past mistakes and myths.

ALL THAT GLITERS

Excessive amounts of coloured pigments, glitter and other types of decorative art can cause enhancements to crack or break more easily. Too much can actually seed the formation of cracks. How much is too much? That depends on what you're using. But one thing's for certain – any foreign object added to the polymer powder can cause the resulting artificial nail to be weaker. A good rule of thumb is that the more that's added, the weaker the nail enhancement. For example, if you add just a little pigment, the nail enhancement will be a little weaker . . . a lot of pigment, a lot weaker. The same holds true for glitter, crystals, feathers, whatever! Any foreign body in the artificial nail can cause weakness and may create service breakdown. So, if you use these decorative additives and are having more service breakdown, they should be the first thing you suspect when you troubleshoot your problem.

Credits:

Figure 9-2 A. & B is courtesy Creative Nail Design, Inc.
Doug Schoon portrait-courtesy Paul Rollins, Laguna Hills, California

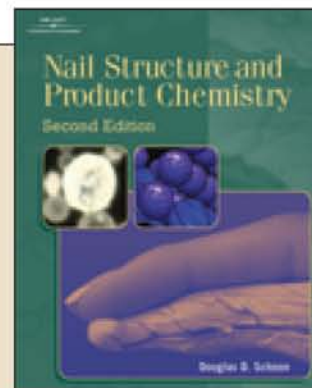


DOUG SCHOON, M.S.

Doug Schoon has over 30 years of scientific experience, a Master's degree in Organic Chemistry and is considered to be the leading research scientist in his field. His unique expertise focuses on the science of both the natural and artificial nail. He is a well-known and respected author, as well as an internationally renowned lecturer and educator.

Mr Schoon is a strong advocate for salon safety. As co-chair of the Nail Manufacturers Council, he frequently represents the entire nail industry on scientific and technical issues in Europe, Canada and the USA and is often called to serve as an expert witness in legal cases involving cosmetic safety and health.

Additionally, dermatologists frequently call Mr Schoon to assist in writing books and scientific papers concerning fingernails. For the last 16 years he has led the scientific research team for Creative Nail Design, Inc. and presently serves as its vice president of Science and Technology. He currently resides in Dana Point, California.



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