Harry F. Bader

How to make new anti-oxidants work

We have come across ready-made anti-oxidants in dispersion form (made by Struktol Co.). Are these effective as compared with our conventional anti-oxidants dispersion as they suggest to use 0.75 phr. of dispersion only?

Ashwani Magon
Paradise Rubber Industries

Struktol antioxidants perform as well as those of other manufacturers. However, whenever you plan to introduce a new antioxidants you should do comparative testing to ensure that the new material works well with your compound.

That is true even if the new anti-oxidant is the same chemical as you are currently using.

Chemicals which are supposed to be chemically the same, sometimes do not perform in an identical fashion.

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We have just started operation of a manufacturing unit for nitrile latex dipped gloves on cotton lining – plain stockinette fabric sewn or raised or fleece variety. Kindly clarify a few points mentioned below:

1. **What is the difference in activity between sodium lauryl sulphonate and sodium dodecyl benzene sulphonate or stabilizer and what is the pH range within which these function properly?**
2. **How does ammonium polyacrylate, PVA and CMC differ in their function as thickness in carboxylated NBR latex and what is the pH range within which they function properly?**
3. **What is the ideal combination – low pH with low level of stabilizer or high pH with low level of stabilizer?**
4. **How can we avoid dripping when no coagulant is used? How is dripping related to pH?**
5. **How can we avoid penetration to the liner – and what are the exact parameters to be used?**
6. **What explains the cracked surface of coated film as it comes out of the curing oven?**
7. **How could we maintain and test the MST and chemical stability as process control parameters?**

B. Dutta

There are many "nitrile" polymers available. The major manufacturers provide technical information in their Product Bulletin, which indicates the stabilizers which should be used and the recommended pH. Reichhold recommends sodium dodecyl benzene sulphonate for all their nitriles. The amount varies. The recommended pH varies dependent on which nitrile you are using. They also recommend the material you should use for pH adjustment.

2. Additions of CMC to a latex compound provide higher viscosities with changes in flow, thickness of pick-up, etc., you expect from increased viscosity. Additions of PVA or an acrylic thickener provide both increased viscosity and increased thixotrophy. Combinations of the two types of thickeners are used to control fabric penetration and film thickness. The pH of nitrile compound should be as recommended by the manufacturer in their Product Bulletin.

Harry F. Bader, Vice-President, Latex Services, Akron Rubber Development Laboratory, Akron, USA, and a world authority on latex, answers questions and doubts of readers on latex and latex products.

Send your questions to:

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Dhanam House,
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3. I would not vary the pH very much from what the manufacturer recommends for the type of nitrile you are using.
4. Dripping occurs when the latex pick-up is too great. This can be controlled in several ways:
   * Reduce the form removal speed.
   * Reduce the form temperature.
   * Increase the latex compound thixotrophy.
   * Increase the latex compound viscosity.
   * Rotate the formers.
5. Same answer as for Question no. 4. To provide exact parameters is not possible when I have no information about your process conditions or your latex compound recipe and its properties. I don't even know which type of nitrile you are using.
6. The major reason for cracking is that the film is not properly dried before it enters the cure oven. I suggest you experiment with form temperatures and drying times and temperatures to determine what conditions are best. Also check the precure of your latex compound. A high precure will make the problem worse.
7. MST can be determined by the method in ASTM D 1076, Section 16. Equipment is available from:

   Atlas Electric Devices Co., 4114 N. Ravenswood Avenue, Chicago, IL 60613-1831
   Tel: 773-327-4520
   Fax: 773-327-5787

Chemical stability can be measured by the ZOV method (Zinc Oxide Viscosity). This measures the increase in viscosity of a latex compound during a controlled addition of zinc oxide.

Another measure of stability is the precure test as illustrated in the Vanderbilt Handbook, but using N butyl alcohol rather than chloroform.

I realize these answers are somewhat vague. However, I know nothing about your latex compound, the fabric you are using, the process you have or the control of your process conditions. It is, therefore, impossible to recommend what you should do to resolve your problems.

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What are the best techniques/ methods for cleaning glove moulds in a factory? In a lab?

Anonymous – submitted at 2001 Latex Conference in Akron, Ohio.

"Best" is dependent upon costs. In high wage rate countries, automatic cleaning with low labour input would be preferred. Labour savings would affect major equipment costs.

However, in lower wage rate countries, savings might not be sufficient to affect major equipment costs. My personal preference is Ultra-Sonic cleaning. This equipment can be installed on-line so that all glove dipping formers are cleaned after each cycle of dipping.

In 1973, Ultra-Sonic equipment was installed on the two glove lines of my factory in Oklahoma City. In 1975, the same equipment was included on the new third line. From that time until the plant closed in 1980, we never removed glove formers for cleaning. First-grade quality during that time was never less than 98%.

The same equipment was used in a batch system for the glove formers used in the manual batch production of industrial gloves.

During that period, we used glove formers from both General Porcelain and Rosenthal (Ceram-tec). We did not experience any former porosity.

The solution in the Ultra-Sonic tanks was 5% Oakite Rust Stripper in water at 70°C. For lab use, this solution could be used with brush scrubbing.

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What is the difference between the process used to produce condoms and the process used to produce medical gloves?

Anonymous – submitted at the 2001 Latex Conference in Akron, Ohio.

Condoms are made by the "straight" dipping method. Usually, two latex dips are used. The process is as follows:

- Condom dipping forms are cleaned and rinsed.
- Forms are air-dried and warmed to a fixed temperature.
- Forms are dipped into the first latex tank.

- Latex viscosity, total solids, pre-cure level, etc. are controlled to give a required first-dip thickness.
- Forms are removed, rotated and spun to evenly distribute the tip droplet, air-dried and warmed to a fixed temperature and moisture content.
- Forms are dipped into the second latex tank. This may be the same as the first tank or the latex may be somewhat different. In either case, properties are controlled.
- Droplet control is repeated as the latex is dried.
- A stripping aid is applied and drying and curing is completed.
- Condoms are usually automatically stripped for further processing, inspection and packing.
- Medical gloves are sometimes made by the same "straight" dipping process with the latex properties being altered to produce a thicker film. However, the usual process is "coagulant" dipping. The most popular coagulant dipping process is as follows:

* Glove dipping forms are cleaned and rinsed.
* Forms are air dried and warmed to a fixed temperature.
* Forms are dipped into a coagulant tank. The coagulant recipe can vary considerably. The vehicle can be water, ethanol or acetone or a mixture of these. Water is the most popular. To the vehicle, a coagulant salt of a strong acid and a weak base (usually Ca2NO3) is added plus wetting agents. The recipe is controlled as is the temperature.
* The coagulant film is air-dried until it is moist, but not wet, and rotation and spin to distribute finger tip droplets occur.
* Forms are dipped into a latex tank. The latex is controlled as with condoms.The time in the latex (dwell time) is also controlled.
* The controlled properties of the latex, the controlled coagulant recipe, the dwell time and the temperature of the latex, the coagulant and the forms determine the film thickness.
* Forms are removed slowly from the latex, rotated and spun for droplet control.
* Forms with the gelled latex film are air-dried until the gel is strong enough for leaching.
* Gelled film is leached.
* Leached film is dried, cured, releached and coated with a stripping aid, not necessarily in that order.
* Gloves are usually manually stripped for further processing, inspection and packing.

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Can natural latex be blended with synthetic latex? If so, what combinations would be successful?

Anonymous – submitted at 2001 Latex Conference in Akron.

I have personal experience with blending natural and synthetic latex that goes back 50 years. So the answer is yes.

As to what combinations would be successful depends on what you wish to achieve. Some of the blends which I consider a success are:

- SBR/natural for foam pillows and mattresses – reduces cost.
- Chloroprene/natural for household and industrial gloves – improved oil resistance.
- Nitrile/natural for instances where improved tear propagation is wanted.
- Chloroprene/natural for instances where reduced air permeation is wanted.
- Nitrile/natural for instances where improved solvent resistance is wanted.

The possibilities are virtually endless. If you achieve the properties you want, the combination is a success.

CLARIFICATION

The query in this column (March-April 2002) on "making a better glove" was inadvertently attributed to Mr. Andrew Tan, who is Executive Director of MARGMA, the prestigious association of glove-makers of Malaysia. It was actually a question from one Josephine Escobar. Margma merely forwarded it to *Rubber Asia* for Mr. Bader's reply.

Editor