The Latex Doctor

Harry F Bader

? What is the effect of particle size of compounding ingredients (sulphur, accelerators and ZnO) on the curing characteristics and vulcanisate properties of NR latex product? Can the dosage of chemicals be reduced by the use of smaller particle size chemicals (say, less than 1 micron) since the available surface area is more?

When I took a trial using perl-milled chemical (particle size <1 micron), instead of ball-milled chemical (particle size 6-9 micron), the results were encouraging. Even with a 10% lesser dosage of slurry, I got better ageing properties for rubberized coir mattress.

Pradeep Kumar P. Joy, Kurlon Ltd.

Particle size of compounding chemicals

Your observations are similar to what I have experienced. However, I've also encountered some problems you should consider.

- Ball-milled or attrition mill-prepared dispersions of latex chemicals should be 2-5 microns. I would expect problems with 6-9 micron dispersions.
- Although good quality latex films can be obtained from compounds having as little as 5% of the normal PHDR of a small particle size chemical, the results are frequently not uniform from batch to batch.
- I'm not sure of the reasons for this. It may be that small quantities require more or better mixing to ensure uniform distribution throughout the compound of critical ingredients which are in very small quantities.'
- Maturing can be much slower and may require longer elevated temperatures.
- Vulcanisation is different. Experimentation is required to determine the optimum conditions of time and temperature.
- Also, experimentation is needed to establish the surface area ratio which produces the optimum results.
- Are your ageing results possibly due to an original undercure condition? How do unaged properties compare?

I believe there is need for more experimental work to ensure uniform material preparation and to ensure uniform compounding and process control.

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.
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Latex quality and finished products

We are finding differences in our finished product properties when the latex we are using comes from different sources. How and why does this happen?

S.M. Pande and others, Kolkata

Our chemical testing/analysis experts think that though they can find differences in latex coming from varying sources, much further testing plus experimental compounding and dipping would be needed to match those differences with varying results in finished products. I agree with that opinion.

Also, you should be performing ASTM D 1076 testing on incoming shipments to ensure the latex meets the D 1076 requirements and possibly and more importantly match the suppliers' data sheet indicating their D 1076 results.

Many years ago I experienced problems similar to what you are having when we were making medical-type gloves on automatic equipment having fixed times and temperatures for leaching, drying and curing.

We eventually found that we had to alter our compounding and latex maturing processes to ensure that the latex going on the line was the same precure level, percentage solids, viscosity and temperature, regardless of the country of origin of the latex or the time of the year the latex was tapped.

When all conditions were the same, the dipped products showed the same properties

I suggest you evaluate the compound when it is ready to go on line. Any differences will likely result in different outcome of the final physical properties.

Problems in blending two nitrile latex grades

We have made products by blending two grades of nitrile latex because we get good film properties and the modulus is all right. We have a few problems and we want to eliminate them.

1. Tear properties are poor.

2. The dipped product was taken from the trial batch. For the first three days, the product was fine in stripping and the film was perfect. After three days, the films developed cracks on stress points of moulds. How can we make latex more stable and avoid precuring?

3. Also, can tensile strength be improved?

Manoj Goswamy
New Delhi

My experience with nitrile latex is mainly with Dow Reichhold. I've successfully used their Types 68074 and 68075. If you are not using Dow Reichhold, ask your supplier about equivalents to those types.

2. Your experience indicates an overcure problem as you have said. Have you done a precure check using N butyl alcohol instead of chloroform which is used for natural latex? This would be a method for tracking precure. If you reduce the heat history, precure should be slower.

3. If you can control the precure, the tensile strength should be improved.

Prevulcanised lattices

What are prevulcanised lattices used for and why?

Anonymous — International Latex Conference

Most latex dipped products and foam products are made from latex which has been matured to some level of prevulcanisation. Precure is prevulcanisation.

It is difficult to hold a compounded latex to a '1' level of precure. Therefore, manufacturers set their process for a higher level of precure including 'total' pre-vulcanisation.

This is to maintain uniform good quality of the product. I am not aware of latex products which cannot be made at some level of prevulcanisation.

Residual accelerators in medical gloves

What are the typical levels of residual accelerators in medical gloves?

Anonymous – International Latex Conference

Levels are improving. We now find that most gloves submitted for testing show 'below detection' limits. This limit varies on the accelerator system which is used. However, below 1.0 ppm is usual.

Leaching of dipped goods

In dipped products, how do you know if you are leaching, the product well enough or long enough?

Ken Rozario, Manila

The final answer is the testing for residual accelerator content and for residual proteins or NR latex allergens.

However, if you operate your leach system at, say, 65°C; have a high degree of water turbulence; maintain a reasonable water throughput to avoid turbidity and continue the leaching for a reasonable time for the product, you are likely to be successful.

Consult before making a claim

Can a latex compound be considered food grade if the raw materials are listed in the Code of Federal Regulations, Title 21 Food and Drugs?

Anonymous – International Latex Conference

Yes. However, there are many conditions within CFR 21 which must be met. These include the amount of the listed contents; the conditions of use; and the passing of tests for extraction level.

I would suggest that before making a claim regarding a product suitability for food contact use, an experienced source of testing and familiarity with the many sections of CFR 21 be consulted. ■