Harry F Bader

Magnesium content in latex - Pinholes in gloves

In your professional opinion can you advise how flavours and pigments (additives) affect the mechanical/physical properties of condoms?

We already have tested some of our coloured/flavoured condoms for biocompatibility tests (by NamSA, Inc), and we are now facing this question. Through many years of our production experience, these materials do not critically affect the quality of condoms. We were asked to establish a professional opinion, and that is why we are seeking your expertise.

General Manager
Dongkuk Techno Rubber
Malaysia.

I have not heard of either mechanical or physical property problems with the addition of flavours, pigments (colourants), or fragrances to the latex compounds used for condoms. There have been some biocompatibility problems. However, I have no specific information.

About two years ago, I did a colourant evaluation project for a major U.S. toy balloon manufacturer. Much to my surprise, we found that vulcanization times and temperatures had to be changed to get good physical properties when balloons with some colourants were being produced. In all cases, good physical properties were obtained by making the changes.

I don't believe that would be a problem with condoms because the colour intensity would be much less. With balloons, the colour must be retained after the balloon is inflated. The quantity of colourant is high compared with that used to produce condom tints.

We are having the classic debate about the differences between Thai and Malaysian latices with one of our customers. The point of contention is the magnesium content and the addition of TMTD:

- **How would an Mg content of, say, 30 ppm on TSC affect a compound for surgical gloves?**
- **Would that compound be greatly affected if, say, the Mg content was 5ppm on TSC?**
- **What is current legislation by the US FDA regarding TMTD content in latices used for exams and surgical gloves?**
- **What developments do you expect to see regarding this legislation in the future?**
- **Our customer finds that they have absolutely no problem with Thai origin LATZ latices, but with HA latex they are experiencing small, rough lumps on their gloves. Any idea how that might be corrected? We request you to shed some light on the matter.**

General Manager
Metalco Co. Ltd.
Thailand

Answer in the same order as questions received.

- A 30 ppm magnesium content would likely reduce both the me-

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

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chanical and chemical stability of a latex compound.

- 5 ppm of Mg in a compound should not be a problem.
- TMTD as an accelerator must be 1.5% or less as a % of latex compound. However, residual accelerators must be much less. Actual allowable amount will be known in may be six months. The allowable amount will likely be in the 50 $\mu g/dm^2$ range.
- Protein limits, powder limits, and residual accelerator limits, will likely be regulated by the end of 1999. There may be more than one limit for each of the three. A change in the amount of allowable TMTD in the compound is not likely.
- You did not explain the nature of the lumps. However, if they are bits of coagulum, they are probably due to low mechanical and chemical stability. Excess Mg could be the reason. As you are aware, phosphate stabilizers will reduce the coagulum problem. Also, excessive mixing time should be avoided.

Please be advised that we are a gloves manufacturing company. Attached, please find the formulations of nitrile latex compounding and coagulant mixing, respectively, that are currently being used.

Based on the aforementioned formulations, please give some comments on them in order to upgrade the quality of our product, as we recently received some complaints from our customers due to the poor quality. For instance, pinholes and shrinkage. The defects were only referred to powderfree nitrile gloves and there was nothing wrong with the pre-powdered type. Furthermore, the defects were only detected once the goods reached the destination, which initially were found in good condition and passed all the QA inspections before shipment took place.

As far as we are concerned, we have no idea whether the defects were due to either our product failures or environmental stress cracking failures, but one thing we are sure of is that chlorination plays a key role in the mentioned defects.

Ng Chang Keong
Pamitex Industries
Malaysia.

Formulations were received. For purposes of confidentiality, these are not being published.

- Shrinkage of nitrile usually happens if the forms are too hot when entering the latex. The gelled latex shrinks down immediately after the forms leave the latex tank. If this is the type of shrinkage you are experiencing, reduce form temperatures.

  I have not experienced shrinkage of a cured nitrile film either with or without chlorination.

- Pinholes frequently begin to leak after chlorination. This condition becomes worse after several weeks' storage. In my experience, this has been due to the thin film over small air bubbles in the glove becoming brittle due to chlorination. This brittleness increases during storage.

  When the glove is stretched, the thin brittle film over the air bubble breaks and leakage occurs. Chlorinated rubber is a brittle material. If bubbles are present in the gloves, the problem you describe will occur.

  The problem can be reduced by reducing the Cl_2 concentration or the time of chlorination. The problem can be eliminated by getting rid of the air bubbles.

- Chlorinated gloves do not age well, particularly if they are over chlorinated. It is possible that instead of the pinhole problem I described above, you are actually getting small cracks in the film which are leaking.

  Microscopic examination of the leak will reveal if it was a crack or if it was a broken air bubble.

- Your formulas are satisfactory. Be sure all powders are ground to less than 5 microns and that additions of all materials are made slowly. Materials such as surfactants, which are sometimes very viscous, should be diluted before being added. ■