

CHAPTER FIVE



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CONCLUSION

5.1 FINAL CONCLUSION

Chlorination has been considered as a good answer to the protein allergy problem. Its ability to reduce the surface friction, remove the non rubber substances and protein are the main advantages. This research shows that according to the level of chlorination there can be complex results with regard to tensile strength, friction coefficient and surface topology. Hence careful consideration should be given to select the optimum chlorination level.

According to Fig. 4.1 and Fig. 4.13 optimum tensile strength and friction coefficient are given at 1150 ppm chlorine concentration at 12 minutes chlorination time. Optical microscopic pictures prove that there are no surface cracks visible on the surface. Extractable protein content is also quite low at this point. However an efficient leaching system should be adopted to further reduce extractable protein content. Hence chlorination at 1150 ppm for 12 minutes can be taken as the optimum chlorination level.

The industrialists prefer the chlorination at 1150 ppm for 4-8 minutes. By analyzing Fig. 4.1 & Fig. 4.13 it can be identified that it is a good chlorination level, but optimum value is the suggested chlorination level since higher chlorine concentrations can cause surface cracks with poor ageing properties.

It can be assumed that the acidified medium has helped the cyclization reaction which distributed the stereo regularity during the initial substitution reaction. This can be avoided to a certain extent by using chlorine gas system instead of acidified Sodium Hypochlorite. Further, chlorine gas system prevents the chlorohydrine formation which reduces the thermal stability of the product.

5.2 FUTURE RECOMMENDATIONS

The chemical reactions which occur during the chlorination can be found out by FTIR Spectrometer. This can confirm the proposed mechanism which was brought forward by this research. It can be used to eliminate the chlorohydrin reaction which reduces

the thermal stability of the product.

Poor ageing is a big problem with the chlorination products. This research can be focused to find the optimum age resistance and its relevant chlorination level.

The temperature of chlorination can have an effect on the reaction rate. The present research was done at room temperature. Hence this can be expanded by varying the chlorination temperature to obtain a further optimum point.

The amount of sulphur used has a direct effect on the chlorination reaction rate. The present research can be broaden by changing the amount of sulphur in the prevulcanised latex.



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ANNEXURES

Annex 1

Dry Rubber Content – 60%
Total Solid Content – 61.5%
Volatile Fatty Acid Number – 0.03
Alkalinity – 0.20
Mechanical Stability Time – 980 seconds
Magnesium Content – 100ppm

Annex 11

Dry Rubber Content – 60.43%
Total Solid Content – 61.81%
Volatile Fatty Acid Number – 0.03
Alkalinity – 0.19
Mechanical Stability Time = 1005 seconds



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REFERENCES

Archer B.L. & McMullen A.I. (1960). Proceedings of the Natural Rubber research conference, Kuala Lumpur

Axelsson J.G.K, Johansson S.G.O. and Wrangsjö K.(1987) IgE mediated anaphylactoid reactions to rubber allergy 42:46-50

Bader H.F.(1996) how to stop pin holes in exams gloves Rubber Asia September-October

Bader H.F.(1997) safe method of chlorination of medical gloves Rubber Asia January-February

Bader H.F.(1997) Condoms also caused allergic reactions Rubber Asia September-October

Bader H.F.(1999) Magnesium content in latex-pinholes in gloves Rubber Asia September-October

Bauer X., Ammon J., Chen Z., Beckman U., Czuppon A.B.,(1993). Health risk in hospitals through airborne allergens for patients pre-sensitised to latex. Lancet 342: 1148-1149

Beezhold D.H., Sussman G.L., (1995) Identification of latex protein allergens, International conference organized by Rubber consultants and European Rubber consultants and European Rubber journal, held in Paris on 11/01/1995

Blackley D.C. Polymer Lattices Science & Technology Vol-1. Chapman and Hall London (1997).

Blackley D.C. Polymer Lattices Science & Technology Vol-2. Chapman and Hall London (1997).

Blackley D.C. Polymer Lattices Science & Technology Vol-3. Chapman and Hall London (1997).

Bloomfield G.F. (1943) journal of the Chemical Society

Bloomfield G.F. (1944) journal of the Chemical Society

Conde Salzar L.B., del-Rio, Guimaraens E. (1943) Type IV allergy rubber additives: A 10 years study of 686 cases

Fah L.P.(1997) NR latex glove benefits outweigh risk Rubber Asia November-December

Ghosal K., Szymanski R.,(2000) Nitriles-Versatile glove materials Rubber Asia January-February

Gorden M.(1951) Proceedings of the Royal Society



HEES, Hintzenstern A., Peters J.V. (1991) Allergic and irritant reactions to rubber gloves in medical health service.

Khew M.C. Chlorination of Natural Rubber latex film.

Kraus G., Reynold W.B.(1950) Journal of the American Chemical society 72, 5621

Palosuo(1995) purification and molecular characterization of latex allergens, International Conference organized by Rubber consultant and European Rubber Journal, held in Paris on 11/01/1995

Rathnayaka U., Makuuchi K. and Yoshii F.(2001) soluble protein free, radiation vulcanised Natural rubber latex

Rosen A., Isaacson D., Barady M., Corey J.P. (1993) Hypersensitive to latex in health care works; report of five cases.

Seaton A., Cherrie B., Turnbull J. (1988). Rubber Glove Asthma Br. Med.J.296;531;532

Vance P. (1997) How to prevent latex protein perils Rubber Asia January-February

Vance P. (1997) Guayule latex an alternative for allergic patients Rubber Asia March-April

Vance P. (1997) are powdered gloves safe? Rubber Asia May-June

Vance P. (1998) Latex allergy : Risk potential and liability Rubber Asia May-June

Vance P. (1998) can latex protein alone cause allergy Rubber Asia November-December



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Vance P. (1999) NR latex glove are still the best choice Rubber Asia May-June

Vance P. (2000) can enzymes reduce latex protein Rubber Asia January-February

Vance P. (2000) is latex a hazardous substance Rubber Asia November-December

Varghese S., Katsumara Y., Makuuchi K., Yoshii F.,(1998) production of soluble Protein free latex by radiation process.

Wiechelman K., Braun R. and Fitzpatrick J. (1988) production of soluble protein free latex by radiation process.

Wiechelman K., Braun R. and Fitzpatrick J.(1988) Investigation of the bicinchoninic acid protein assay.

