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DEPROTEINISED NATURAL RUBBER

This finding relates to preparation of deproteinised natural rubber by enzymatic deproteinisation of natural rubber latex using liquid papain.

INTRODUCTUION

The conventionally prepared natural rubber has very high tensile strength modulus and resilience due to which it is used in a very large number of latex and dry rubber based products. Though NR has very good dynamic mechanical properties this can be further improved by removal of the proteins present in it. This modification imparts in addition, a lower water absorption quality. There are many applications where water absorption needs to be lower and stringent dynamic mechanical properties with reference to creep and stress relaxation are required. In such applications deproteinised natural rubber is a better choice than the conventionally prepared natural rubber.

Deproteinized natural rubber (DPNR) is a purified form of natural rubber (NR) with very low nitrogen and ash contents. The special virtue of DPNR is its low water absorption and electrical stability which it imparts to vulcanized rubber compounds immersed in water. DPNR based products offer reduced creep and modulus precision that enable them to be used in engineering applications.

Either mechanical or chemical means are common for reducing protein content of latex. The mechanical process involves multiple centrifugation or membrane filtration of diluted latex. The chemical treatment involves a combination of digestion with a proteolytic enzyme or displacement of adsorbed proteins using a surfactant and the subsequent purification of the treated latex by centrifugation or creaming.

Here, a method of producing DPNR by enzymatic deproteinisation using liquid papain is standardized.

OBJECTIVE

The objective of the finding is to standardize a simple and cheap process based on enzymatic hydrolysis of proteins for production of DPNR.

SUMMARY

The deproteinisation is carried out using papain followed by creaming. Papain is a proteolytic enzyme preparation derived from papaya plants (*Carica papaya*). Preserved field latex is mixed with suitable chemicals in the required proportion. This is stirred well and kept undisturbed for 48 hours. DPNR is processed from this latex.

MAIN OBSERVATIONS

DPNR has lower nitrogen content, ash content, a lower accelerated storage hardening and a lower PRI than ISNR 5. Mooney viscosity of DPNR is only slightly lower than that of ISNR 5. Comparable strength, modulus, tear strength, elongation at break and heat build-up are observed for DPNR. Water absorption is more for the DPNR prepared by alkaline treatment method but low for the sample prepared by creaming method when compared with ISNR 5. Stress relaxation is better for the DPNR samples prepared by both the methods.

CONCLUSION

Deproteinised natural rubber can be prepared by a process based on enzymatic hydrolysis of proteins. DPNR has a lower water absorption quality and shows lower stress relaxation along with good mechanical properties than ISNR 5.