

DESIGN OF A TECHNIQUE

TO STUDY THE STRESS RELAXATION BEHAVIOUR OF CROSSLINKED

RUBBERS SUBJECTED TO A CONSTANT TENSILE STRAIN

by

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## SYNOPSIS

The objective of this work was to design a technique to study the stress relaxation behaviour of crosslinked rubbers subjected to a constant tensile strain, with provision for monitoring two independent parameters namely

- a. The force on the specimen (under constant strain) at a given time,
- b. The instantaneous modulus of the specimen at a given time, which is given by the gradient of the force versus deflection curve when the strained specimen is subjected to a further deformation at the time of measurement.

The importance of these two parameters lies in the fact that the decay of the force on the specimen under constant strain is a good estimate of the cleavage of the chemical bonds on the rubber network with time while the instantaneous modulus is an indication of the influence of the secondary network formed by the cleaved bonds on the rubber.

The theories of stress relaxation and the equipment available for stress relaxation measurements are discussed in detail in this work in addition to the details of the proposed technique. It should be mentioned that especial emphasis was made here to reduce the cost of equipment when compared with the standard equipments available so that this technique could be made more popular among quality control as well as research workers. In this respect, the proposed equipment was designed in such a way that the load measuring device, which is the most expensive component in the set up could be shared among number of specimens under observations, without disturbing their deformations.

Number of specimens prepared under similar conditions were tested using the proposed equipment to study its reproducibility. It was found that the decay of the force on the strained specimen with time was showing excellent reproducibility even though the instantaneous modulus did not show such behaviour. A detailed analysis of these results with further modifications recommended is given at the latter part of this work.



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