

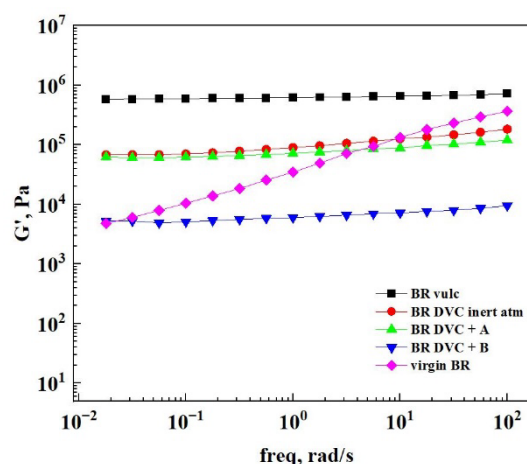
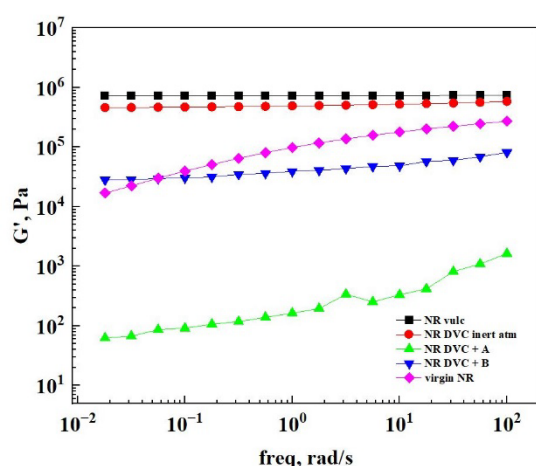
Rheological characterization of devulcanized elastomers

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The main scope of this work is the rheological analysis of the degradation behavior of vulcanized elastomers, that is a really important topic to carry out research on, since one of the main use of this kind of material is related to the production of tyres. The problem lays in the disposal and recycling of these tires, since not only vulcanized materials are very difficult to recycle, but also the usual tyre formulation comprises of a large number of different rubber polymers (e.g. natural rubber, butadiene rubber, styrene-butadiene rubber), fillers and additives, exponentially increasing the difficulty of the recycling steps. An innovative way in which these materials can be made recyclable or even be directly recycled is the process known as “devulcanization” in which, through either mechanical, thermal, chemical treatments, or even a combination of them, the vulcanized material is partially or totally reversed. This process is extremely complex, for this reason, as a first step in the search for a possible way of efficiently recycling tyres, the focus of this work was to analyze several elastomers which are commonly used in tyre formulations. For this reason, some synthetic rubbers were rheologically analyzed together with natural rubber to understand their different behaviour after vulcanization and devulcanization process. Afterwards, the rheological behaviors of the different elastomeric blends with different rubber matrix were studied, following the addition of a devulcanization agent with the aim of improving and facilitating the devulcanization process of the compound.



References:

- [1] <http://polymerdatabase.com/polymer%20chemistry/Thermal%20Degradation%20Elastomers.html>
- [2] RUBBER CHEMISTRY AND TECHNOLOGY, Vol. 85, No. 3, pp. 408 – 449 (2012)
- [3] RUBBER CHEMISTRY AND TECHNOLOGY, Vol. 87, No. 1, pp. 31 – 42 (2014)
- [4] Flory, Paul J. (1953). Principles of polymer chemistry. Ithaca: Cornell University Press, Chapter XI
- [5] Coran, A.Y. (2003), Chemistry of the vulcanization and protection of elastomers: A review of the achievements. J. Appl. Polym. Sci., 87: 24-30.