



Systematic Analysis of Rubber Compounds

Summary

Two compounds were analyzed and a formula reconstructed from the results. This approximated formula was compared to the original compound. The techniques required for reconstruction of the compound include chemical identification of the components, quantitative and semi-quantitative analysis and a thorough understanding of the application and processing requirements of the product.

Stress-strain properties were used as a final guideline. The accuracy of the analysis can be shown as follows:

1. Quantitative determination of polymer, carbon black, filler and extractables content was most accurate and readily determined. In the two compounds analyzed agreement was within 5% on the major components.
2. Qualitative determination of the polymer is again accurate and fairly easily determined by I.R. Specific polymer grades are, however, difficult to determine and are most often approximated based on knowledge of the compounds' use.
3. Determination of the carbon black type is being investigated but in general the application of the compound and its physical properties is still used to determine the type of black.
4. Filler ash analysis is very accurate qualitatively and semi-quantitatively. Knowledge of rubber compounding is useful in determining some levels.
5. Extract analysis allows accurate determination of antidegradants and some plasticizers. Because of the purity of some of the chemicals, changes which occur in vulcanization and difficulty of separation of the large number of possible ingredients in the extract, this analysis is often the most difficult.

Interpretation of the results with respect to measured stress-strain properties and known application of the compounds allowed a close approximation of the original formula to be made. These techniques can be used to analyse for one component or an entire compound as was done here. For identification of single

components controls should be run. In the case of identification of the complete compound, the final control is an actual factory trial.

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