

Finding solutions is our business....

.... And we're pretty good at it

DSM Resolve.
P.O.Box 18
6160 MD Geleen
Netherlands
tel.+31 (0)46 4760100
info.Resolve@dsm.com
www.dsm-resolve.com

Business case
Resolve 035



Unraveling the composition of in-house produced or rival rubber compound? An analytical challenge!

Complex composition determines product properties

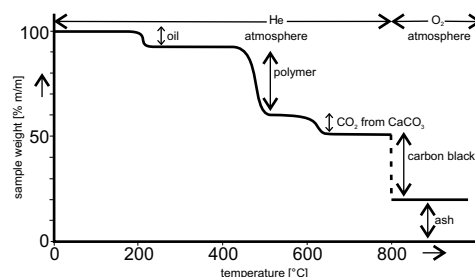
Rubber compounds often have a complex composition. Typically, only about 1/3 of a compound is elastomer. Other ingredients are oil, carbon black, vulcanization ingredients and various types of filler, such as the natural mineral fillers clay, talc and calcium carbonate or man made, like silicas. Sulfur and accelerators are used for vulcanization in over 80% of cases. These components are accurately proportioned because they largely determine the properties of the vulcanized end product. It is therefore key to be able to control and reproduce the recipe of such a rubber compound both in vulcanized and non-vulcanized species.

Reverse engineering of the rubber composition

A wide variety of analytical techniques is required to be able to reverse engineer the composition of a rubber compound. We at DSM Resolve have an analytical toolbox broad enough to do this. Some examples:

Using Thermo Gravimetric Analysis (TGA) direct evidence can be obtained, in a single run, of the amount and type of rubber, the amount of carbon black, the amounts of calcium carbonate and the ash content (see Figure). From the product remaining after the high temperature scan the ash content (residual inorganic species) can be analyzed via elemental analysis techniques (X-ray fluorescence). Additional information about the composition of the rubber

compound can even be obtained from the analysis of the ash content. In some cases more sophisticated techniques such as FT-IR and NMR are used to identify the type of rubber (or rubbers) in (co-) vulcanizates. Especially liquid state NMR and solid state NMR (both available here) reveal subtleties in the composition of bulk rubbers such as EP(D)M, SBR, NBR, BR, IR, IIR, and specialties like H-NBR, CM, ACM and EVM. These measurements can be performed in both raw rubbers and vulcanized rubbers. All these measurements lead to an unambiguous determination of the composition of the rubber compound of interest to you.



DSM Resolve, your partner in problem solving

We have not only detailed and practice oriented product and process knowledge on a wide variety of rubbers, in particular on EP(D)M, as well as a comprehensive toolbox of standard (FT-IR, DSC, TGA, XRF) and advanced techniques (NMR, Raman, Pyrolyse-GC), DSM Resolve can provide answers to lots of questions related rubbers. Do not hesitate to contact DSM Resolve for help.