

MOL-5816 Elastomeric Materials
Exam 20.12.2011

1. *Answers in English.*

1.a. The two most important groups of reinforcing fillers are carbon black and silica. What are the main differences between the two fillers in terms of primary particle size, structure, processing behavior and reinforcing strength?

1.b. Why is silica used in passenger car tire treads instead of carbon black?

1.c. Due to its chemical structure, silica tends to have strong filler-filler interactions and weak filler-polymer interactions. How can this be overcome?

2. *Answers in English*

2.a. Rank aromatic, paraffinic, naphthenic and synthetic plasticizers according to their polarity.

2.b. What is the most important property for compatibility between plasticizers and polymers?

2.c. Give for each of the 4 types of plasticizers 2 polymers which are compatible with these plasticizers.

3. Effect of oxidation on elastomers.

Hapettumisen vaikutus elastomeereihin.

4. Explain the function of different components in the rubber formula below. Is there any component missing?

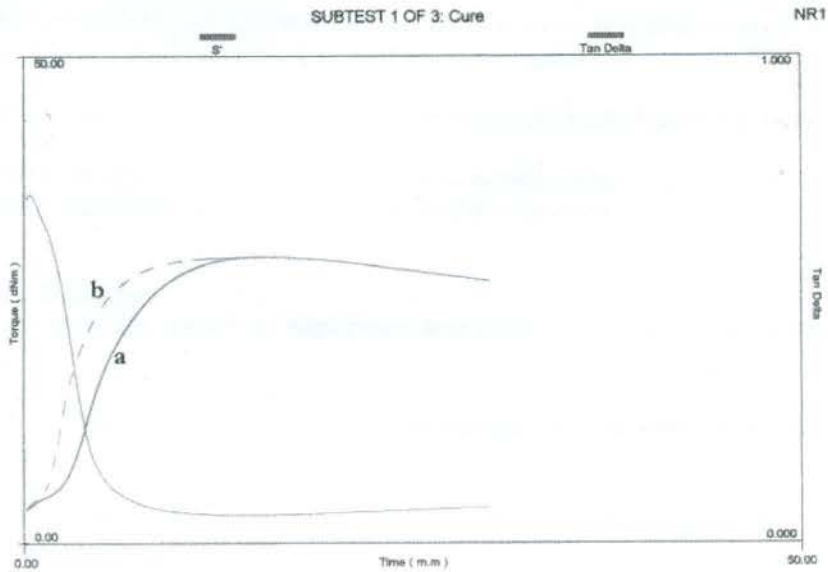
Selitä alla olevan reseptin komponenttien merkitys kumissa. Puuttuuko joku komponentti?

100.0 EPDM Keltan 4802
100.0 Carbon black N 550
100.0 Kaolin
100.0 Paraffin oil
5.0 ZnO
2.0 6PPD
2.0 Sulphur
1.0 Stearic acid

5. The stages of the mixing process.

Sekoituksen vaiheet.

6. In the picture below, there is presented a rheogram of natural rubber. Explain the curve a. How would you change the recipe to follow curve b?
 Alla olevassa kuvassa on esitetty luonnonkumin reometrikäyrä. Selitä mitä tapahtuu käyrällä a. Miten muuttaisit reseptiä niin, että reometrikäyrästä tulisi vaihtoehdon b kaltainen?



7. Please give your opinion about the class, especially if there are things missing / to be improved. What did you like?
 Ruusuja ja risuja kiitos.