ALTERNATIVE ANTIOZONANT TO 6PPD FOR USE IN TYRES

Elastomer Technology and Engineering
stretching science

This MSc assignment will be realized in cooperation with Apollo Tyres Global R&D.

6PPD is an organic chemical used worldwide as a very efficient anti-degradant of rubber products. In tyres, 6PPD protects rubber components against their degradation by ozone and prevents cracking of the tyre surface.

Recent studies show that 6PPD transformation product, 6PPD-quinone, can occur at toxic concentrations in urban creeks with proximity to busy roadways, where it might be responsible for the death of an aquatic species*. Further, exposure to air emissions and dermal contact with 6PPD is suspected of causing harm to human health if a certain threshold is reached.

Due to these human and animal health & safety concerns and growing environmental requirements, stringent legislation will arise against the use of 6PPD. It is predicted that within several years, the use of 6PPD will be restricted (limited) or completely banned.

Due to this, a safer and equally efficient antiozonant alternative to 6PPD is searched. Ideally, a substitute should be from a sustainable source and efficient in low concentration.

Objective

This assignment aims to search for an alternative antiozonant to 6PPD, within commercially available synthetic substances, sustainable nature-derived substances, and their combination. This will be followed by an evaluation of the effectiveness of the alternative substances in tyre compounds.

Assignment

The student will perform the following steps:

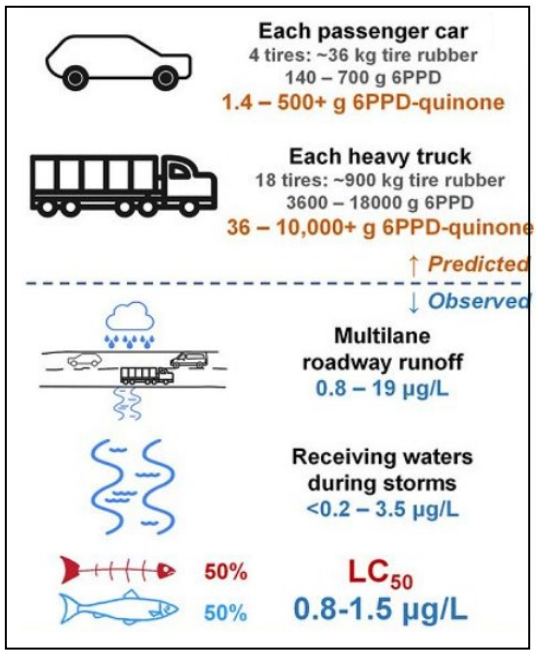
- Literature research on alternative substances to 6PPD
- Selection of alternative substances for further tests
- Laboratory study on the efficacy of the selected substances and their combinations
- Data analysis and interpretation of the results
- Proposal of the best alternative composition of anti-degradants

Cooperation with Apollo Tyres Global R&D

Report

A report for Apollo Tyres Glabal R&D with all relevant information will be prepared.

Fig. 1: Environmental relevance of 6PPD-quinone*



* *Z. Tian, H. Zhao, K. T. Peter, et al. A ubiquitous tire rubber–derived chemical induces acute mortality in coho salmon,* Science, *2021, 371:185-189.*

Partners

This project will be done in cooperation with Apollo Tyres Global R&D (Colosseum 2, Enschede).

Contact

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