MATERIALS AND METHODS

Any results from the experimental screening approaches (SPME-GC, Microtox® and DAPHTOXKIT FTM) are presented in Table 2. Acute toxicity data from guideline studies as well as those predicted using the PETROTOX model are summarised in Table 3. There is reasonable agreement between the toxicity data from guideline studies and the screening approaches, with all screening approaches correctly predicting the white spirits to be the most toxic substances and indicating a lack of toxicity in substances with higher carbon chain lengths due to their very low water solubility. The white spirits exhibit greater toxicity due to their aromatic content, which contributes to their aromatics relative to lower hydrocarbon chains. SPME-GC data indicate a much greater response in the white spirits than in other substances, which is indicative of the higher content of hydrocarbons present in these WAFs. When compared separately, GTL and GOMG solvents have similar responses at comparable carbon ranges, which gradually reduce to baseline levels at higher carbon number ranges, indicating that very little material is present in these solvents. This suggests that toxicity of these substances is more comparable.

Microtox® results are in agreement with SPME-GC data, but appear to be less sensitive. Apart from the white spirits, only the highest concentration of solvent exhibited toxic effects, which is in line with the results from guideline tests. PETROTOX® showed a similar relationship with carbon number, although in some cases the results were more or less sensitive than in guideline studies. For example, effects were seen in the lightest GOMG grade which were not reproduced in the guideline test, and effects in the highest de-aromatised solvent were much less severe than in the guideline test. A previous sensitivity comparison with 30 substances, a strong correlation (R² = 0.971) was found between results of DAPHTOXKIT FTM and OECD 202 guideline studies. PETROTOX® calculations predicted a similar relationship with hydrocarbon chain length, although results were generally much more conservative than experimental data. Also toxicity was predicted to occur in higher chain length solvents that were not observed experimentally.

In the absence of guideline acute toxicity data for higher carbon chain GTL solvents, the data generated using screening methods provided a robust weight of evidence of an overall lack of toxicity, and support read-across of data for non-aromatic containing solvents to support endpoint requirements such as those under REACH.

RESULTS AND DISCUSSION

Carbon chain structure can form powerful and cost-effective tools to assess substances properties as part of an integrated testing strategy or weight of evidence approach.

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Zeolites, zeolite-based sorbents, and zeolite-modified sorbents are often used as adsorbents to remove hydrocarbons from water. Zeolite-based sorbents have the advantage of being reusable and having a high adsorption capacity. However, zeolites are not very selective and can adsorb a wide range of compounds. Zeolite-modified sorbents, on the other hand, are more selective and can be used to remove specific types of hydrocarbons. These sorbents are often used in conjunction with other methods such as reverse-phase liquid chromatography or high-performance liquid chromatography to achieve high levels of selectivity for the hydrocarbons of interest.

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