

OBSERVATIONS AND DISCUSSION

Generally, weathering (evaporation) resulted in a sequential loss of the lower molecular weight compounds. Within each volume reduction, lower boiling point components were lost before the heavier components. In some instances, weathering of the samples caused the ignitable liquid to change ASTM classification when the early components were lost. For example, SRN 775, STP Octane Booster, is classified as “miscellaneous” because of the significant abundance of earlier eluting aromatics in the product; however, after 50% weathering had occurred the sub-component class changed to “heavy petroleum distillate,” as the early abundant aromatics were lost.

While most of the weathered samples (especially those lightly weathered) are directly relatable to the parent (un-weathered) samples, this is not consistently true for the biologically degraded samples. Degradation by microbes was inconsistent and highly variable. Replicate analysis of the same ignitable liquid placed in the same batch of potting soil and sampled after the same amount of time was performed. While the only difference was the elapsed time between the preparations and the moisture of the potting soil, variations in the resulting data were seen. The major degradation observed in the ILRC study typically occurred between 0 to 7 days. Some peaks present in biodegraded samples may not be from the liquid but from the soil itself or metabolites from the microbial action. In additional testing, samples heated to 85° C for 4 hours contained aldehydes; suspected by-products of the microbial digestion of the ignitable liquids. While some ignitable liquids may be suggested in a biodegraded sample, the changes may not allow a conclusive classification.

Microorganisms may have preferences for the types of chemicals they use as carbon sources. In addition, bacteria may be opportunistic in the selection of compounds preferred for consumption and may evolve to change their preferred food source. This transition is dependent on the chemicals available and the microbe's ability to utilize inducible enzymes. As one preferred source becomes depleted, the microbes adapt and are increasingly able to consume a separate source. For example, some microbes may initially prefer to consume alkanes. As the alkanes are consumed and are no longer present, the microbes adapt and consume other classes of compounds (e.g. alkene or aromatic compounds); though the mechanism to do so requires more energy and a different approach [3]. The committee feels that this factor has contributed to some of the variations we have seen. The same would also relate to differences between the data generated and available in this database, and what is observed in real world fire debris samples.