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TRANSPORTATION FUEL PRECURSORS FROM UNCONVENTIONAL SOURCES

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Oil sands are a naturally occurring mixture of bitumen, sand, clay and water, containing 10 to 12 wt% bitumen or extra heavy oil, defined as oil with a density greater than 960 kg/m^3. In 2004, production of oil sands products was 1 million barrels per day. Several sources project that bitumen derived crude oil production will reach 3 million barrels per day in 2015, and production could reach 5 million barrels per day in 2030. The relative yields of transportation fuel precursors in conventional light petroleum and bitumen derived crude oil are different. Further, oil sands transportation fuel precursors contain more aromatic and cycloparaffinic compounds than corresponding conventional light crude oil products.

From 2005 to 2030, global personal mobility needs will stimulate an evolution of technologies in vehicles, advanced low-temperature combustion engines as well as transportation fuels. This is motivated by concern for human health and the environment – to reduce criteria air contaminants and to mitigate climate change. The volume of North American transportation fuels derived from oil sands will increase 3 to 5 times in this time period, and future fuels will include increasing amounts of oil sands, bio-renewable, shale oil, and Fisher-Tropsch derived materials.

Differences between oil sands products and those from conventional heavy oil are reduced by increased processing severity. Commercial bitumen upgrading to synthetic crude oil includes coking and hydrocracking. In this study, refinery streams from both coked and hydrocracked synthetic crude oil are compared. Analyses indicate the same hydrocarbon classes but detailed information on isomers is not readily available from conventional analyses. A range of analytical data is available on the streams, including C13 and 1H NMR, and FI, CI and EI GC/MS. The chemistry of selected streams will be compared and contrasted.