Fossil fuels may still contribute to air pollution even when the car is turned off

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Long-chain alkanes, key chemical components of fossil fuels such as gasoline, contribute to urban air pollution even if they are not combusted, reports a study published in *Communications Chemistry*.

In combustion processes, such as in car engines, a chain reaction called autoxidation occurs at high temperatures. Recently, autoxidation was identified as an important source for highly oxygenated chemicals in the atmosphere, which result in organic aerosol air pollution. Conventional chemical knowledge suggests that for an autoxidation reaction to occur at atmospheric, low-temperature conditions, suitable structural features like carbon–carbon double bonds or oxygen-containing groups have to be present in the chemicals. Having neither of these features, alkanes, the primary fuel type in combustion engines and an important class of urban trace gases, were thought to have minor susceptibility to autoxidation.

Zhandong Wang and colleagues used recently developed, highly sensitive mass spectrometry to measure both radicals and oxidation products of alkanes. They found that the studied C6–C10 alkanes undergo autoxidation much more efficiently than previously thought, both under combustion and atmospheric conditions. Even at high concentrations of NOX, which typically rapidly terminate autoxidation reactions in urban areas, these alkanes produce considerable amounts of highly oxygenated products that can contribute to urban organic aerosol pollution.

These results have direct implications for improving both engine efficiency and urban air quality.

More information: Zhandong Wang et al. Efficient alkane oxidation under combustion engine and atmospheric conditions, *Communications Chemistry* (2021). DOI: 10.1038/s42004-020-00445-3

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