

# Catalysis — Where We Should Apply it Now!

*Applying the catalytic converter technology used in the automobile to other processes can improve our air quality.*

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The recent interest in alternative fuel sources and alternative engine technology is driven, in part, by the desire to reduce smog and its associated health problems in the larger urbanized areas. Much of this smog is attributed to car exhaust, but what are the facts?

Modern cars have catalytic converters which reduce most cars' four-stroke-cylinder-based internal combustion engine emission to not much more than clean carbon dioxide and water vapour. Contrast this to the soot belching typical diesel engine, as found in most buses, trucks, and heavy machinery. Add to this the large number of low-temperature combustion home heating and industrial power generation furnaces burning either oil or coal, the true source of much of the smog will become more apparent. Soot contains high levels of polynuclear aromatic hydrocarbons (PAHs), many of which are known mutagens and carcinogens. Even a wood burning stove or fireplace contributes much more of this type of pollution than several cars together. Smoke and soot are visibly emanating from most of the urban wood, oil, or coal burning furnaces. In contrast, a well-operating municipal waste incinerator, such as the one in Hamilton, ON, burns some 20 tons of garbage every hour and emits less smoke than one sees rising from most house chimneys.

If the catalytic converter works so well for automobiles — as it does — why not apply this technology to diesel engines, and residential and industrial chimneys as well? Obviously, some modifications of the typical converter will be required; foremost, an external pre-heater to get the system up to operating temperature, but once there, it should pretty well be self-sustaining through the heat generation of the catalytic conversion process. Modern technology would not exist if it were not for the many wonderful chemical processes whose doors were opened through effective catalysts of one sort or another. We should learn to apply them also to the improvement of our urban environment, especially when we have to breathe the air polluted by diesel engines and the like.

Adapting the tried and proven automobile catalytic converter technology to the many hitherto uncontrolled sources of soot particles, smog, and its precursor molecules in the urban environment would be a goal well worthwhile. Most likely, research

into that would quickly lead to improvements in air quality and be money better spent than trying to build zero-emission vehicles based on engines which use a totally different and unproven technology and fuel system [1]. Very recently, the Canadian government released the *ARET Report No. 3* [2]. It shows a steady reduction in emissions of many toxic substances, including PAHs, from many of the larger Canadian industrial facilities. Some of these reductions have been achieved by catalytic treatment of emissions. It is about time to pull even with similar reductions in the common transportation and household arena.

## References

1. Kaiser, K.L.E., 'Hydrogen, Fuel of the Future?' *ACCN*, **51(5):29**, 1999.
2. *ARET. Environmental Leaders 3, Voluntary Action on Toxic Substances*, ISBN 0-662-27691-4, 65 p., 1999.

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