Toward the design of greener consumer products

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Scientists are reporting a new method for predicting how certain materials may contribute to global warming. Credit: US Environmental Protection Agency

So you're a manufacturer about to introduce a new consumer product to the marketplace. Will that product or the manufacture of the product contribute to global warming through the greenhouse effect?

Until now, there was no clear way to answer that question. Scientists are reporting development of a new method for screening molecules and predicting how certain materials, ranging from chemicals used in carpeting to electronics, will contribute to global warming. Their study is scheduled for the Nov. 12 issue of ACS' *Journal of Physical Chemistry A*.

In the new study, Timothy Lee, Partha Bera, and Joseph Francisco note

that carbon dioxide is the main greenhouse gas, which traps heat near Earth's surface like the panes of glass in a greenhouse. However, other gases have the same effect, and in fact are even more efficient greenhouse gases than carbon dioxide. Scientists know that the molecules in gases differ in their ability to contribute to global warming. But they know little about the hows and whys - the molecular basis of those differences.

The scientists analyzed more than a dozen molecules involved in global warming to find out which chemical and physical properties are most important in determining their inherent radiative efficiency, and thus possess the largest potential to contribute to global warming. They found that molecules containing several fluorine atoms tend to be strong greenhouse gases, compared to molecules containing chlorine and/or hydrogen. They found for the first time that molecules containing several fluorine atoms bonded to the same carbon increase their radiative efficiency in a non-linear fashion. "It is hoped that the results from this study will be used in the design of more environmentally friendly materials," the study notes.

More information: "Identifying the Molecular Origin of Global Warming", Journal of Physical Chemistry *A*.

Source: American Chemical Society (news : web)