Mechanism of NO\textsubscript{x} Conversion Over Photocatalytic Cement

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Research Question: What constituents/conditions of cement over TiO\textsubscript{2} are promoting toxic N\textsubscript{2}O Production?

Abstract

Cement constituents in combination with TiO\textsubscript{2} are to be analyzed for their possible contribution to N\textsubscript{2}O production under varying conditions and configurations.

Introduction

- TiO\textsubscript{2} is useful to reduce harmful gasses produced by cars and/or powerplants.
- TiO\textsubscript{2} may also be producing Nitrous Oxide, a gas with global warming potential.
- TiO\textsubscript{2} will be tested alone, in cement, and with individual cement components.

Test Samples

- Pure TiO\textsubscript{2}
- TiO\textsubscript{2} in cement
- TiO\textsubscript{2} with individual cement components

Analytical Methods

- Fourier Transform Infrared (FTIR) Spectrometer.
- Diffuse Reflectance Infrared Transmission spectroscopy (DRIFTS)

Experimental

- Samples will be exposed to NO gas at different humidity levels.
- Ultraviolet light will activate TiO\textsubscript{2}.

Outcomes

- Previous studies have shown the variation of product formation with modified TiO\textsubscript{2} surfaces [2].
- Wavelengths of 350-370 nm observed most nitrous oxide production [3].
- Lime (CaO/63% of cement), produces N\textsubscript{2}O through an intermediate step during an adsorbing process, so Lime is a prime suspect in N\textsubscript{2}O production [3].
- Provide insight on solutions for new/existing systems using TiO\textsubscript{2} to avoid any further environmental contamination.

References


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