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Low Temperature SO<sub>2</sub> Oxidation Catalyst

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Abstract:

TDA is developing a Cs-V<sub>2</sub>O<sub>5</sub>/SiO<sub>2</sub> based catalyst for SO<sub>2</sub> oxidation that contains a proprietary promoter that allows it to operate at temperatures as low as 340°C when used in the 4<sup>th</sup> bed of the SO<sub>2</sub> converter in a sulfuric acid plant. Figure 1 shows the conversion possible with TDA's low temperature catalyst compared to a conventional SO<sub>2</sub> oxidation catalyst. By using TDA's SO<sub>2</sub> oxidation catalyst and operating at 340°C, the maximum thermodynamic conversion limit is 99.89%. Figure 2 shows that we obtained 99.6% experimentally under 4<sup>th</sup> bed conditions, which is substantially higher than the 98.8% measured using a commercial catalyst at ~400°C. Figure 3 shows that no deactivation was observed over the course of 900 hours of laboratory testing (again 4<sup>th</sup> bed conditions) for two separate tests with the same catalyst.

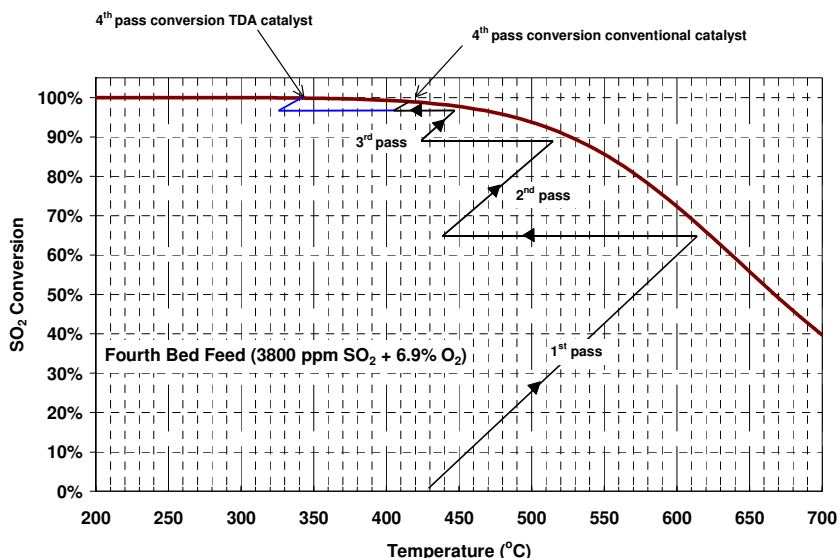


Figure 1. Conventional and TDA SO<sub>2</sub> oxidation catalysts compared with equilibrium limit.

With funding from the Department of Energy, TDA synthesized and tested a series of catalysts and compared their activities to several commercial catalysts. We are currently optimizing our catalyst formulation and making reaction rate and other kinetic measurements. We will scale up the catalyst and carry out bench scale demonstrations with the scaled up formulations.

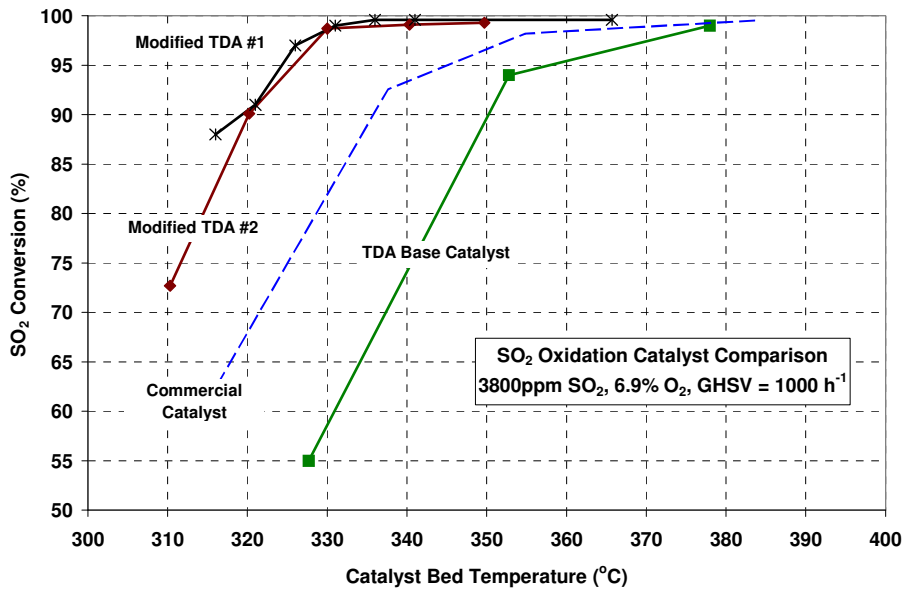


Figure 2. Activity vs. temperature for TDA and commercial catalysts.

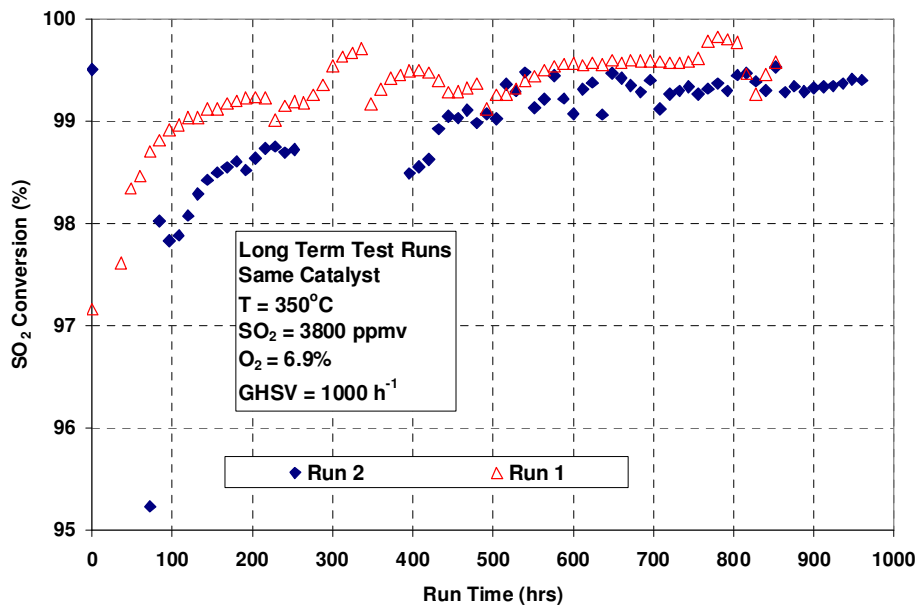


Figure 3. Two 900 hour lifetime tests with TDA's catalyst.