

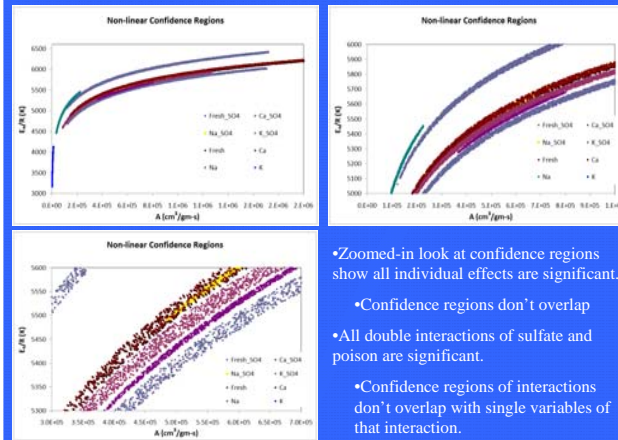
Non-linear Regression and Statistical Analysis Applied to SCR Deactivation Data

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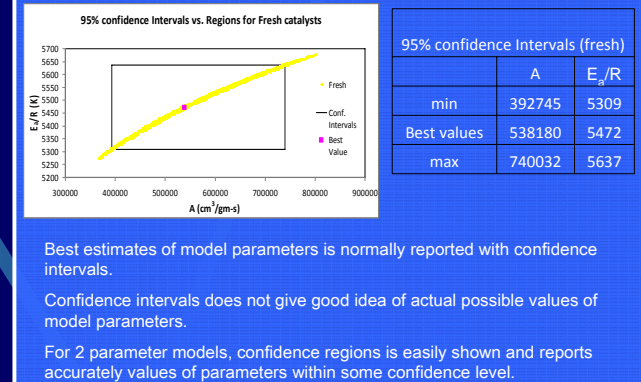
Objectives

- Evaluate data set used to determine sulfate species, alkali, and alkaline earth compound impacts on SCR performance.
 - Data is of rate constant vs. Temperature
- Solve for best values of Arrhenius parameters using non-linear regression tools in R.
- Compare 95% confidence regions to determine which variables and interactions are significant.
- Compare non-linear vs. linear regression results
- Compare confidence intervals to confidence regions.

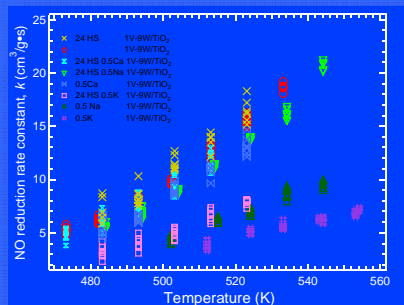
95% confidence regions of parameters



Confidence intervals vs. confidence regions

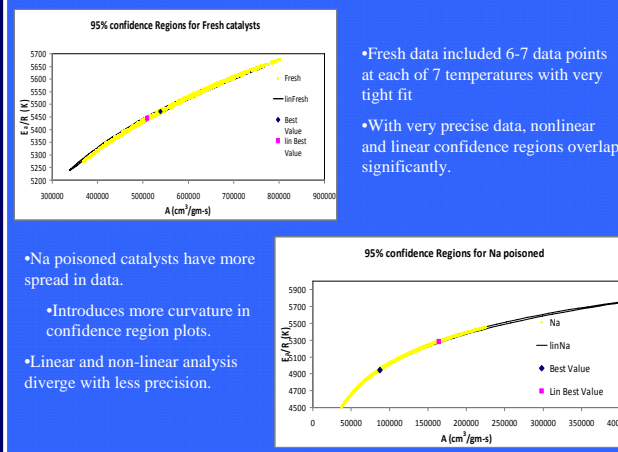


SCR Data Set



- Catalyst poisoning increases with basicity of poisons $\text{Ca} < \text{Na}, < \text{K}$.
- Sulfate increases catalysts activity
- Data sets include fresh catalyst; poisoning via Ca, Na or K; and sulfate on fresh catalyst and poisoning via Ca, Na or K.

95% confidence regions of Parameters



Conclusion

- Non-linear regression must be performed on non-linear models for accurate parameter fits.
- With more precise data sets, approximation by linear regression becomes better.
- Confidence regions must be included in publications to give accurate representations of parameter values within some confidence level.