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A COMPARISON OF THERMAL DECOMPOSITION KINETICS
FOR SANTA ROSA AND UTAH TAR SAND

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ABSTRACT

Recently, geological studies of many tar sand deposits have shown the distinctive nature and unique characteristics of each site. Similarly one might expect that since the geological history of deposits has varied, so will the chemical composition and pyrolysis kinetics be different for each site; however, very few comparative studies have been performed. Samples from Utah's Tar Sand Triangle and from New Mexico's Santa Rosa deposit were subjected to both isothermal and nonisothermal pyrolysis. From the resulting weight loss curves kinetic parameters were calculated and compared. Linear heating rates in the range of 1 to 50 degrees Centigrade per minute were used for the nonisothermal studies.

To analyze, compare, and determine kinetic parameters, the data were treated using the Coats-Redfern first order kinetic model and the three parameter statistical model of Anthony-Howard. As is often the case when using the Coats-Redfern model the nonisothermal data showed two distinct regions, i. e. , one below 425°C and the second between 425 and 500°C. When the activation energies were compared, the Tar Sand Triangle sample showed much greater activation energies for both temperature regions. The calculated Coats-Redfern activation energies for the 425-500°C temperature region are:

Sample Location	Activation Energy Kcal/mole
Utah Tar Sand Triangle	40.0
New Mexico Santa Rosa	26.0

These observed differences in activation energies for samples from two geologically different deposits indicates that there may be important chemical variations from site to site and that these differences should be considered in the design of commercial recovery processes.

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