PHYSICAL CHEMISTRY
Special Study 71-9
Job No. 8506322

THERMAL STABILITY OF AROCLOR 5060/NaOH/LIME (LOW COLOR AROCLOR 5460)

INTRODUCTION

Thermal stability data are needed for further plant testing of the low color Aroclor 5460 process at Anniston. Addition of sodium hydroxide and lime in a recent plant test resulted in an apparent decomposition.

SUMMARY

The Monsanto built pressure DTA apparatus was used to test the thermal stability of Aroclor 5060 with 2.5% NaOH pellets and 1% lime present. The test was run under a nitrogen atmosphere. A small fusion endotherm was observed at about 60° C. (no gas evolution) followed by a series of minor endotherms up to about 215° C. At about 230° C. a significant exothermic reaction began and gas evolution was also detected. The exotherm peaked at 305° C. with a maximum Δt of about 4° C. This reaction was not large enough for calculation of heat evolution rates but gas evolution rates were calculated. The reaction increased the sample cell pressure about 150 psi from 270° to 320° C. A plot of the calculated gas evolution rates is attached. The 1.0 g-millimole/min/Kg rate at 277° C. is equal to 22.4 cc/min/Kg (STP).

Infrared analysis of non-condensable decomposition vapors showed methane, carbon dioxide and carbon monoxide to be present. Condensable vapors accounted for 73% of the final cell pressure of 218 psig at 364° C. The sample vapor pressure plot, used for the gas evolution calculations, showed 7.6 psig at 253° C. to indicate a very low water content.

These data probably provide sufficient reason for the sudden reaction experienced when the addition was made at 250° C. or higher. Our DTA cell was not stirred, a factor which undoubtedly retarded the reaction. The sodium hydroxide and lime should be added at lower temperatures or at slower rates to control the reaction.

att. 1
Reference: DTA #71-21

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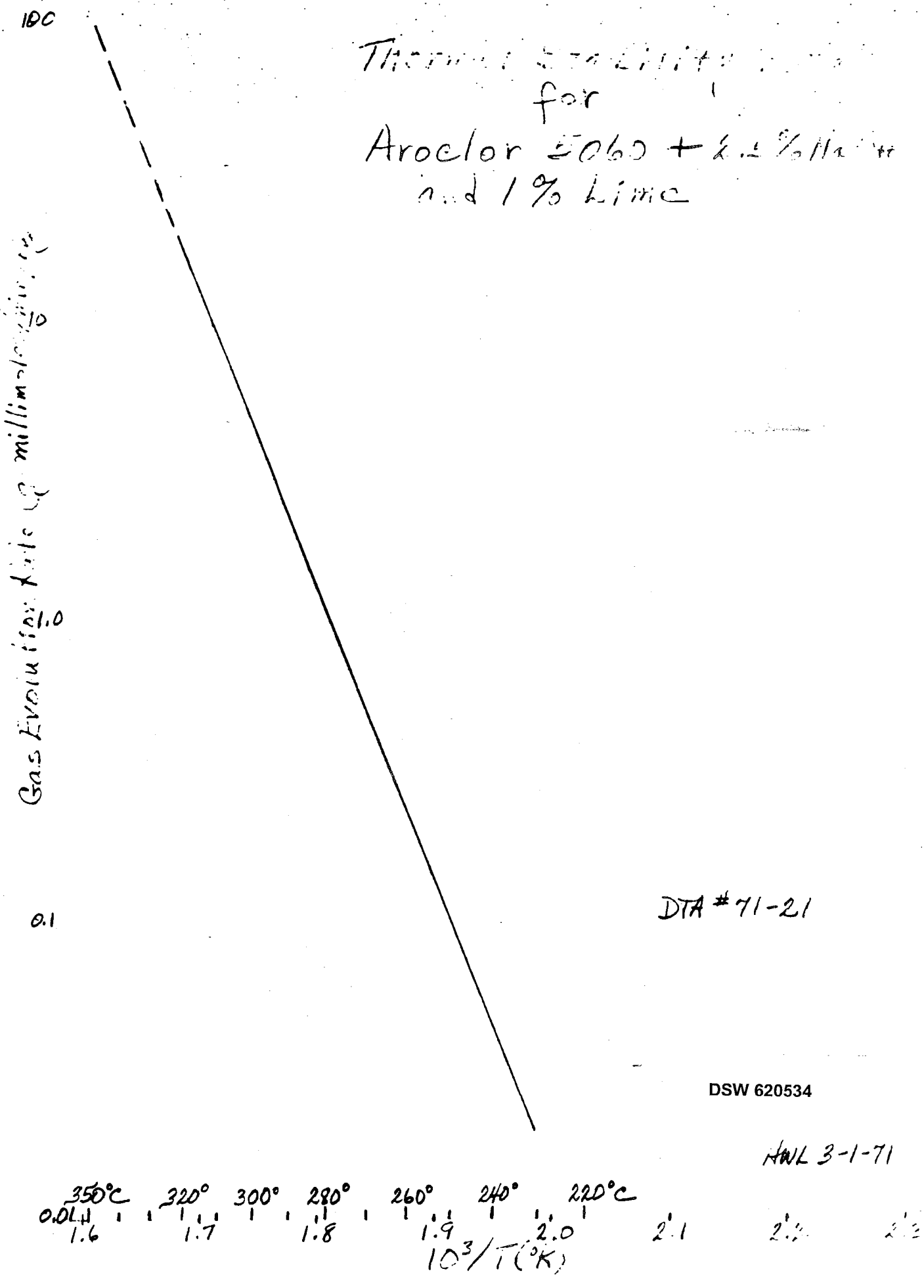

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