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THE TEXAS COMPANY

REFINING DEPARTMENT
TECHNICAL & RESEARCH DIVISION

REPORT ON

LOW SPACE VELOCITY OPERATION
ALAN WOOD CATALYST

MONTEBELLO RUN 51

PERSONAL AND CONFIDENTIAL

Laboratory MONTEBELLO

Report No. TDC-802-39-P

Date APRIL 2, 1951

STRICTLY CONFIDENTIAL

BRIEF OF PARTIAL REPORT

Laboratory Montebello
Date Approved April 2, 1951
Date Work Completed Nov. 9, 1949

Experiment No. TDC-802
Partial Report No. 59
Subject: Hydrocarbon Synthesis

Subject: Low Space Velocity Operation With Alan Wood Catalyst

Object: To determine whether a decrease in synthesis gas throughput corresponding to the use of three or four reactors instead of two at Brownsville would raise the yield with Alan Wood magnetite catalyst to the original design level.

History: Previous operation at flow rates corresponding to full Brownsville design throughput with Alan Wood magnetite catalyst at Montebello had resulted in yields approximately 20 per cent under design. Since Run 49 had indicated that yields could be increased by decreasing the fresh feed space velocity at constant linear velocity by raising the bed height, the present work was undertaken to determine whether additional increases in yields could be obtained by decreasing the linear velocity at the maximum bed height level.

Experimental Work: Work was done at 400 psig, 650°F, 1:1 recycle at fresh feed rates corresponding to 2/3 and 1/2 Brownsville design. During a short period at 2/3 feed rate 6 mol per cent water was injected into the feed gas.

Conclusions:

1. A reduction in fresh feed rate corresponding to the use of three reactors instead of two at Brownsville, resulted in an increase of total liquid yield equivalent from 6386 to 7129 Bbl./Day, basis the Brownsville design feed rate. This corresponds to an increase in income of about $4,450 per day and will justify the cost of a third reactor if the plant continues to operate on a catalyst of the Alan Wood activity level.

2. A further decrease in fresh feed rate corresponding to the use of four reactors at Brownsville failed to show any further increase in yield. This places the minimum allowable inlet velocity at about 0.6 ft./sec.

3. The injection of steam into the reactor inlet at a rate approximating the quantity produced in the generator resulted in a drop of about 10 per cent in total liquid yield indicating that the removal of water vapor from the fresh feed is probably justified economically.

4. A correlation of conversion with selectivity shows a progressive loss in selectivity as inlet velocity is reduced below 1 ft./sec. This loss does not offset the effect of space velocity between the two-reactor and three-reactor conditions but does offset the effect between the three-reactor and four-reactor conditions.

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HYDROCARBON SYNTHESIS

PARTIAL REPORT NO. 39

Montebello Laboratory — Experiment No. TDC-80?
Work Completed November 9, 1949 — Report Approved April 2, 195?

LOW SPACE VELOCITY OPERATION
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INDEX

INDEX TO FIGURES

INDEX TO TABLES