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# THE TEXAS COMPANY

REFINING DEPARTMENT  
TECHNICAL & RESEARCH DIVISION

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REPORT ON

**REVIEW OF SYNTHESIS OPERATIONS IN**  
**MONTEBELLO REACTOR No. 3—RUNS 44 AND 45**

PERSONAL AND  
CONFIDENTIAL

Laboratory MONTEBELLO

Report No. TDC-802-32-P

Date JUNE 15, 1950

STRICTLY CONFIDENTIAL

BRIEF OF PARTIAL REPORT

Laboratory Montebello  
Date Approved May 26, 1950  
Work Completed Feb. 2, 1949

Experiment No. TDC-802  
Partial Report No. 32  
Subject: Hydrocarbon  
Synthesis

- Subject: Review of Synthesis Operations in Montebello Reactor No. 3 - Runs 44 and 45.
- Object: To study the synthesis of hydrocarbons from carbon monoxide and hydrogen in Montebello Reactor No. 3 with mill scale catalyst.
- History: Three other reactors had been used previously in synthesis work at Montebello. The Montebello Reactor No. 1 was a 10-inch vertical reactor with three 2-inch cooling tubes. Reactor No. 2 was a 12-inch vertical reactor with a 1-inch helically coiled steam cooling tube. The Stratco Reactor (not numbered) was a 16-inch mechanically agitated oil cooled reactor.
- Experimental Results: After a shake-down and personnel training period, the Montebello Reactor No. 3, a 12-inch vertical reactor with three 2-inch cooling tubes, was operated satisfactorily at 325 psig pressure with mill scale catalyst promoted with 1.0% K<sub>2</sub>O.
- Conclusions:
1. The operation of Montebello Reactor No. 3 was considered superior to that of Reactor No. 1 which had relatively greater cooling surface.
  2. Both the addition of reduced catalyst to the reactor and the circulation of hot hydrogen through the catalyst bed resulted in temporary increases in yields of C<sub>3</sub>+.
  3. There was a tendency for the yields of oil to decrease with time.
  4. During operation with only reduced mill scale catalyst charged to the reactor, (a) the yields of the C<sub>3</sub>+ produce increased with increasing catalyst bed height and catalyst inventory, and (b) the density of the C<sub>3</sub>+ product remained constant with changes in the catalyst inventory.
  5. After some unreduced mill scale catalyst (one-fourth of the total in the reactor) had been added, and despite the subsequent addition of reduced catalyst, (a) the yields of the total C<sub>3</sub>+ product increased with increasing bed height and catalyst inventory but the yield levels were relatively lower than before the addition of unreduced catalyst, and (b) the density of the C<sub>3</sub>+ product increased with increasing catalyst inventory. This was traceable to a decline in the yield of the C<sub>3</sub>-C<sub>6</sub> fraction.

HYDROCARBON SYNTHESIS

PARTIAL REPORT NO. 32

Montebello Laboratory  
Work Completed Feb. 2, 1949

Experiment No. TDC-802  
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REVIEW OF SYNTHESIS OPERATIONS IN  
MONTEBELLO REACTOR NO. 3 - RUNS 44 AND 45

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