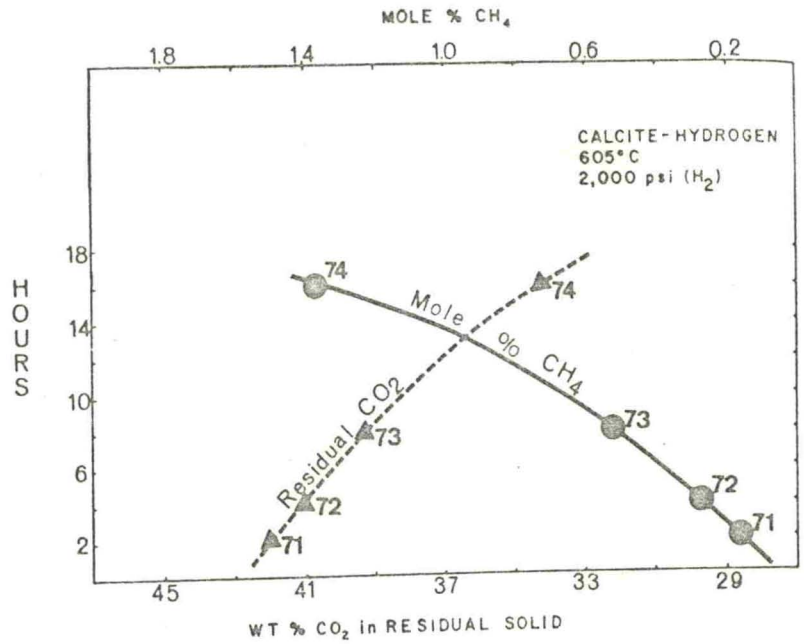

FIG. 4. Plot of mole % CH_4 generated in the calcite-hydrogen system and residual CO_2 remaining as calcite in experiments run at 605°C; 2000 psi (H_2); for 2, 4, 8, and 16 hours.

ergy change for reaction A is less sensitive to increasing temperature and at about 540°C reaction A is thermodynamically favored over reaction B.

Graphite is present mainly along calcium hydroxide surfaces, with lesser amounts occurring within the calcium hydroxide. At runs at higher temperatures (>700°C) a "soot-like" material formed in the bomb. It was readily wiped clean from the sides of the bomb. Only rarely was this "soot-like" material ever associated with the solids within the platinum cassette. Examination of the analytical data (Table I) reveals that at higher temperatures (experiment 81) there is a much larger weight loss of carbon as CO_2 in the solid than can be accounted for as carbon in the generated CH_4. This discrepancy is beyond analytical error. The "soot-like" material appears to be amorphous carbon formed through the thermal dissociation of methane, and higher hydrocarbons if they formed. Any higher hydrocarbons formed by pyrolysis of the methane would be unstable and none were found in the gas analysis. Carbon and hydrogen are the end products of methane pyrolysis, but equilibrium is difficult to attain. Catalysis can hasten equilibrium. The dissociation of methane is catalytically promoted by platinum, iron, nickel, all of which are present in these experiments.

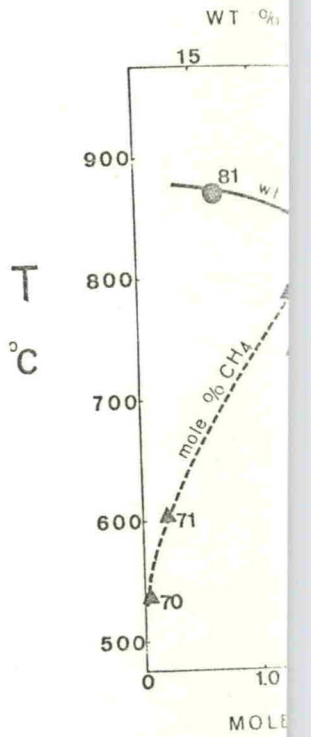

FIG. 5. In the calcite-hydrogen system
CO_2 remaining as calcite in experiments r
790, and 870°C.

Analysis of the reaction gases s
restricted in number even though
possible in the C-H-O system. Th
C_2H_6; H_2O; CO; and CO_2. The l
ment (no. 75). This experiment w
pressure was only 200 psi.[1] The
sures may be explained, at least
lations for a simplified C-H-O gas
culations show that decreasing p
water relative to methane and
findings.

It appears that methane and
of methane, form directly rathe

[1] Fugacities vary with pressure, con
in the equilibrium will also vary with p