

gments of 40 to 60  
al hydrogen, the fol-  
(H)<sub>2</sub>; graphite; and  
I<sub>2</sub>O also formed.  
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ct. Simplified equa-



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mately, the free en-

e-Hydrogen  
2, 2000 psi(H<sub>2</sub>)



From experiments 71,  
o-first-order nature of

TABLE 1. MASS SPECTROGRAPHIC ANALYSES OF REACTION GASES<sup>a,b,c</sup> AND Wet-CHEMICAL ANALYSES OF RESIDUAL CO<sub>2</sub> IN UNREACTED CALCITE: CALCITE-HYDROGEN SYSTEM

| Experiment No.                              | 70   | 71   | 72   | 73   | 74   | 75   | 77   | 78   | 79   | 80   | 81   | 82   | 90                | 91   | 92                | 93                |
|---|------|------|------|------|------|------|------|------|------|------|------|------|-------------------|------|-------------------|-------------------|
| Temperature (°C)                            | 535  | 605  | 605  | 605  | 605  | 700  | 700  | 700  | 700  | 790  | 870  | 650  | 610               | 735  | 713               | 700               |
| Pressure (psi)                              | 2000 | 2000 | 2000 | 2000 | 2000 | 200  | 2000 | 8000 | 2000 | 2000 | 2000 | 2000 | 2000              | 2000 | 400               | 4000              |
| Wt. % CO remain-<br>ing in solid            | 43.0 | 42.0 | 41.0 | 39.3 | 34.2 | 41.2 | 26.8 | 36.0 | 33.4 | 34.5 | 16.3 | 36.9 | N.A. <sup>d</sup> | 37.8 | N.A. <sup>d</sup> | N.A. <sup>d</sup> |
| Duration of run<br>(hours)                  | 2    | 2    | 4    | 8    | 16   | 2    | 8    | 2    | 4    | 2    | 2    | 4    | 12.5              | 2    | 2                 | 2                 |
| Mole % CH <sub>4</sub> in gas               | 0.02 | 0.17 | 0.28 | 0.53 | 1.38 | 1.83 | 2.67 | 0.37 | 1.34 | 1.43 | 1.95 | 0.89 | 1.64              | 1.39 | 2.37              | 0.99              |
| Mole % C <sub>2</sub> H <sub>6</sub> in gas | —    | —    | —    | —    | —    | —    | —    | —    | —    | —    | —    | —    | 0.01              | —    | —                 | —                 |
| Mole % CO in gas                            | —    | —    | —    | —    | —    | 1.10 | —    | —    | —    | —    | —    | —    | —                 | —    | 0.31              | —                 |
| Mole % CO <sub>2</sub> in gas               | —    | —    | —    | —    | —    | 0.11 | —    | —    | —    | —    | —    | —    | —                 | —    | 0.04              | —                 |
| Mole % H <sub>2</sub> in gas                | 99.6 | 99.8 | 99.7 | 99.4 | 99.5 | 96.2 | 97.2 | 99.6 | 98.6 | 98.3 | 98.0 | 99.0 | 98.1              | 98.6 | 97.2              | 99.0              |
| Mole % He in gas                            | 0.40 | 0.08 | 0.04 | 0.07 | 0.09 | 0.75 | 0.11 | 0.02 | 0.07 | 0.23 | 0.06 | 0.10 | 0.24              | —    | 0.11              | 20.01             |

<sup>a</sup> Analysis calculated on water free basis.

<sup>b</sup> Starting hydrogen impurities given as follows: less than 5 ppm N<sub>2</sub>, less than 1 ppm O<sub>2</sub>, less than 1/2 ppm CO<sub>2</sub>, less than 1/2 ppm CO<sub>2</sub>, Dew Point—100°F.

<sup>c</sup> Detection limit 0.01%.

<sup>d</sup> Not analyzed.