trends reported in the space velocity range 0.5 to 2.0 $cm^3g^{-1}s^{-1}$ were confirmed in these experiments. The effect of space velocity in the range of 0.5 to 2.0 $cm^3g^{-1}s^{-1}$ at different total pressures on olefin selectivity is presented in Figure 59 to Figure 63. The olefin selectivity for the total C_2-C_4 hydrocarbon fraction was insensitive to space velocity at reactor pressures below 4400 KPa, that is, the olefin to paraffin ratio was consistently 3/1 regardless of the pressure and/or space velocity. The olefin to paraffin ratio of the C_3 hydrocarbon fraction was consistently higher than that of the C_4 hydrocarbon fraction and declined with increasing space velocity at constant pressure. At constant space velocity the olefin to paraffin ratio of the C_3 and the C_4 hydrocarbon fractions decreased with increasing pressure while that of the C_2 hydrocarbon fraction increased.

The effect of the hydrogen to carbon monoxide ratio on the conversion of carbon monoxide at different reactor pressures is presented in Figure 65. The conversion increased with increasing hydrogen to carbon monoxide ratio at fixed pressure and with increasing pressure at fixed hydrogen to carbon monoxide ratio. The effect of hydrogen to carbon monoxide ratio on the yield of carbon dioxide is presented in Figure 66. The carbon dioxide yield decreased with increasing hydrogen to carbon monoxide ratio at constant pressure and decreased with increasing pressure at constant H_2/CO ratio. The effect of the hydrogen to carbon monoxide ratio of the reactant gas on the product distribution (methane, carbon dioxide and C_2-C_4 hydrocarbons) at different reaction pressures is presented in Figure 67 through Figure 71. The methane yield

Figure 65

Effect of H_2/CO Ratio on Carbon Monoxide Conversion

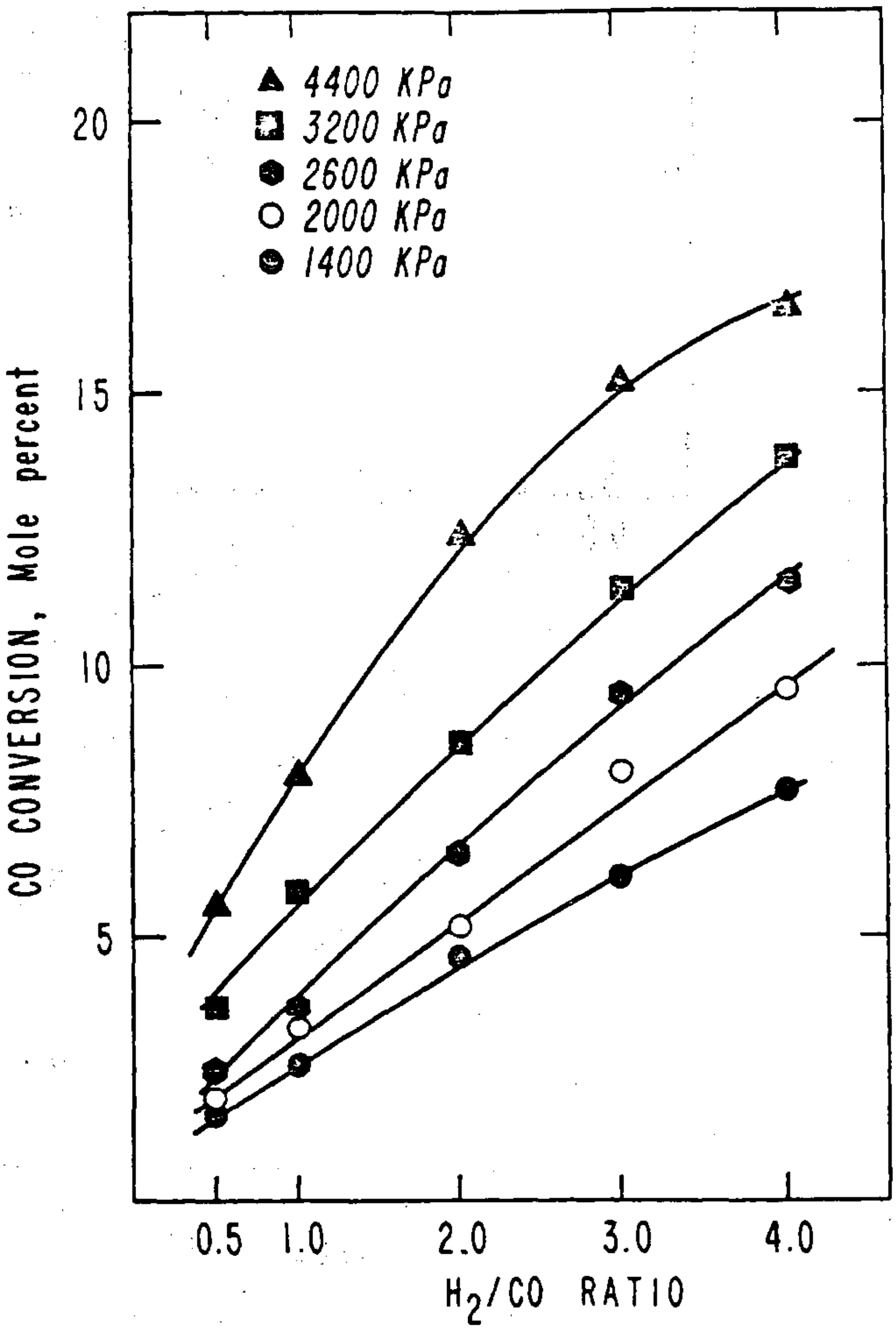
Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K;

Pressure = 1400 - 4400 KPa;

Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 cm^3s^{-1}.



4400 KPa
3200 KPa
2600 KPa
2000 KPa
1400 KPa
20
15
10
5
CO CONVERSION, Mole percent
0.5
1.0
2.0
3.0
4.0
H2/CO RATIO

Figure 66

Effect of H_2/CO Ratio on Carbon Dioxide Yield

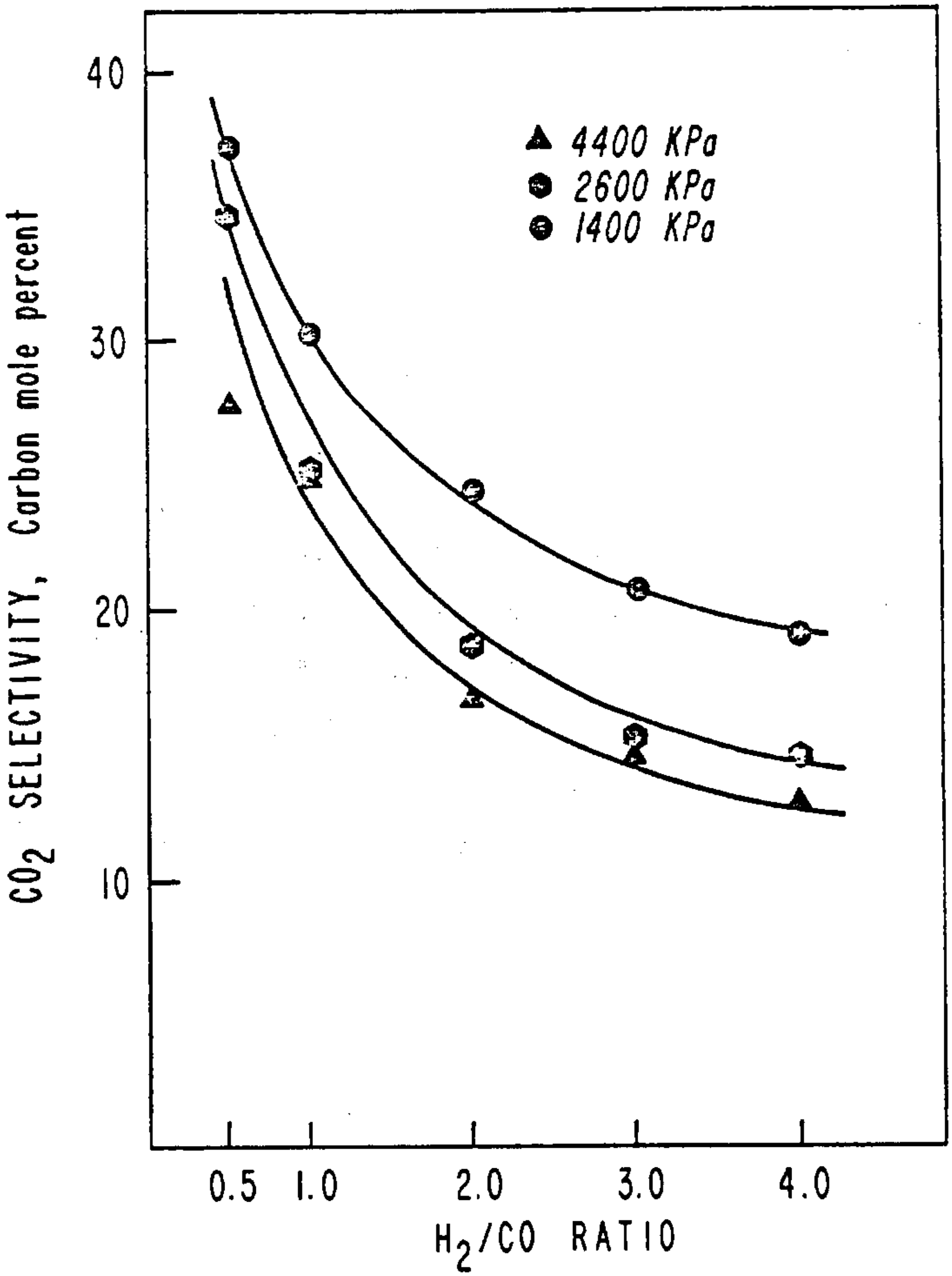
Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K;

Pressure = 1400, 2600 and 4400 KPa;

Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 cm^3s^{-1}.



4400 KPa
2600 KPa
1400 KPa
40
30
20
10
CO_2 SELECTIVITY, Carbon mole percent
0.5
1.0
2.0
3.0
4.0
H_2/CO RATIO

Figure 67

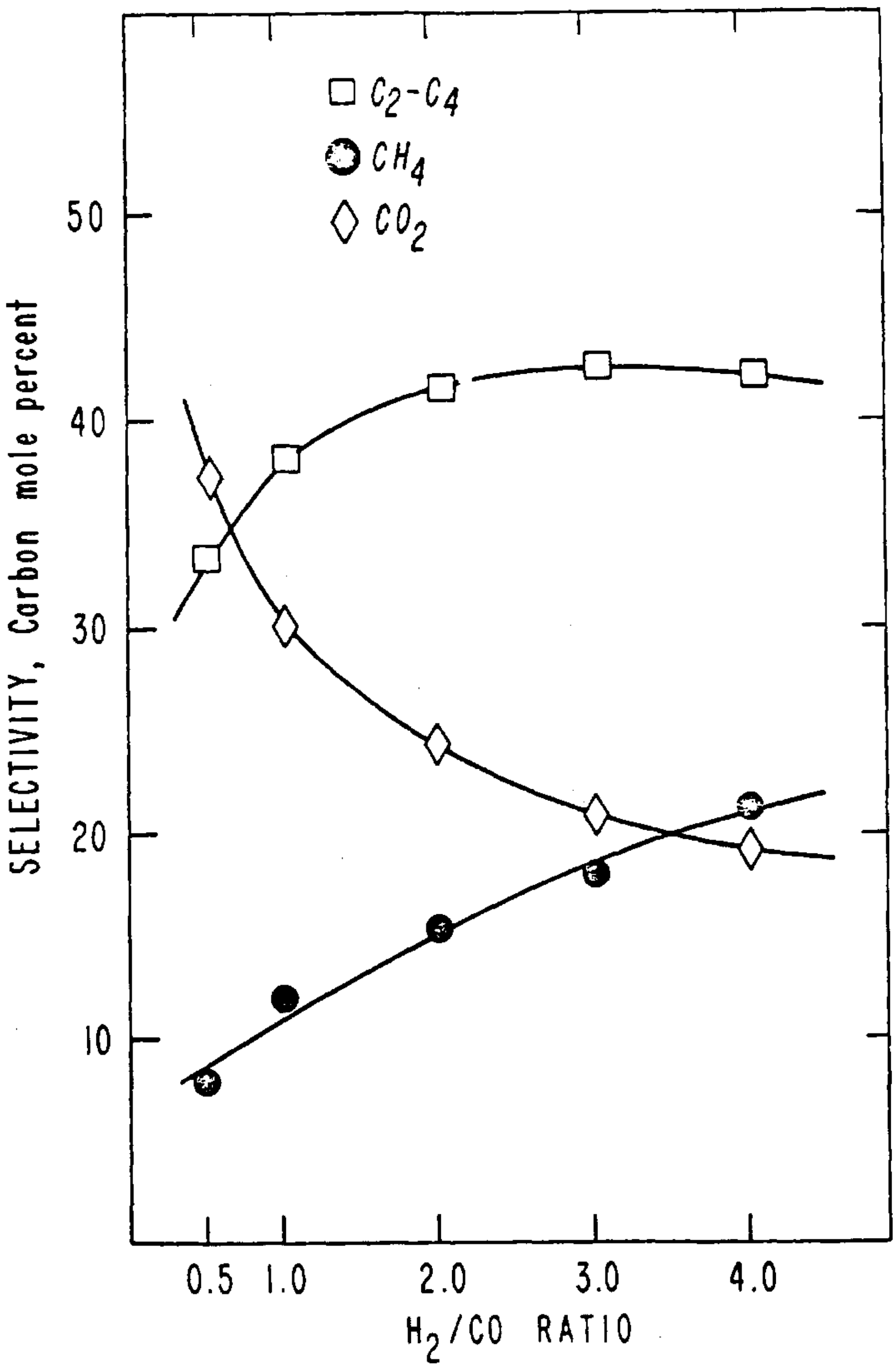
Effect of H_2/CO Ratio on Product Distribution

Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K;

Pressure = 1400 KPa; Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate = 0.103 cm^3s^{-1}.



C2-C4
CH4
CO2
50
40
30
20
10
SELECTIVITY, Carbon mole percent
0.5
1.0
2.0
3.0
4.0
H2/CO RATIO

Figure 68

Effect of H_2/CO Ratio on Product Distribution

Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K; Pressure = 2000 KPa;

Space Velocity = 1 $cm^3 g^{-1} s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 $cm^3 s^{-1}$.

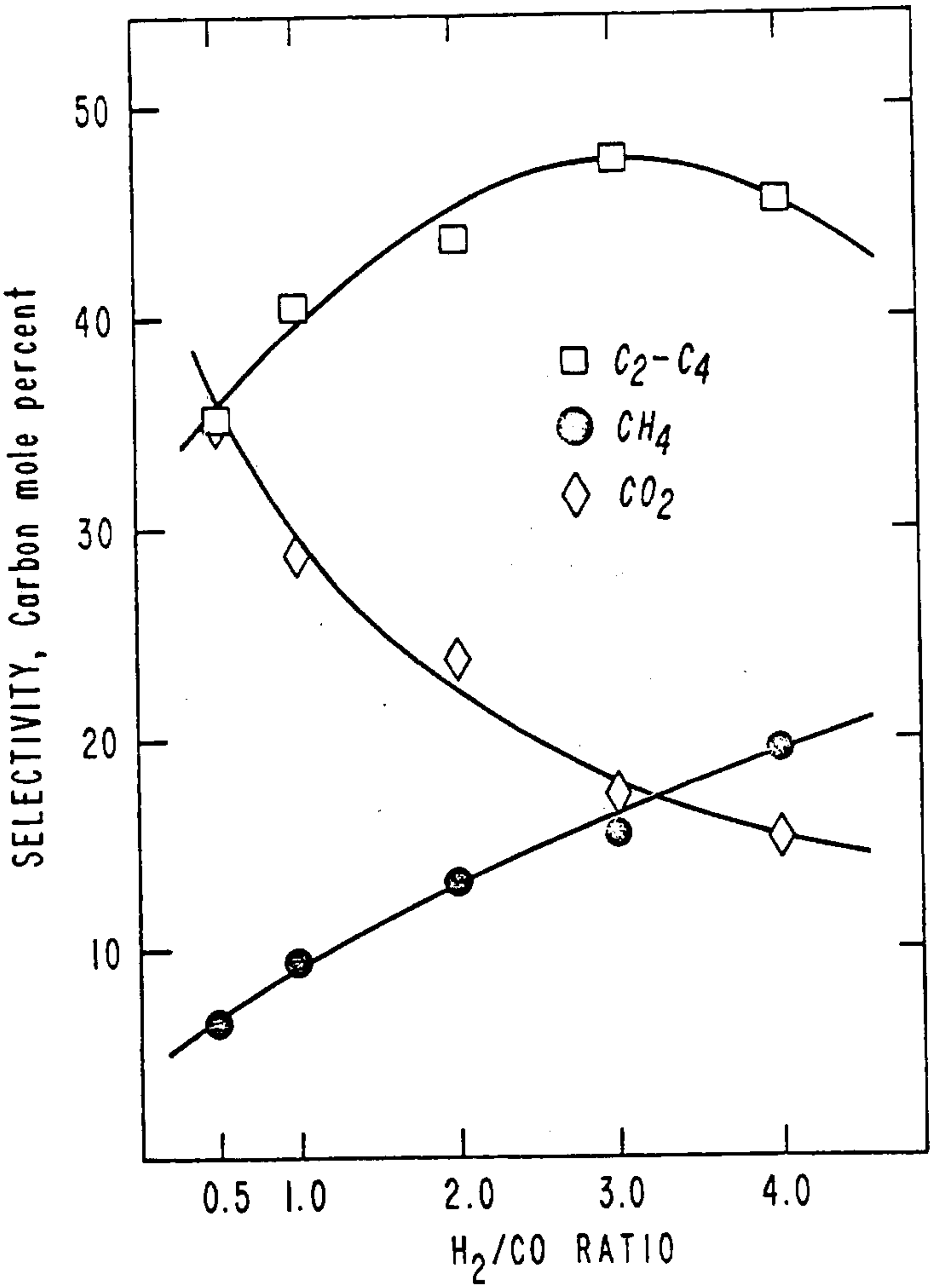

50
40
30
20
10
SELECTIVITY, Carbon mole percent
0.5
1.0
2.0
3.0
4.0
H2/CO RATIO
C2-C4
CH4
CO2

Figure 69

Effect of H_2/CO Ratio on Product Distribution

Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K; Pressure = 2600 KPa;

Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 cm^3s^{-1}.

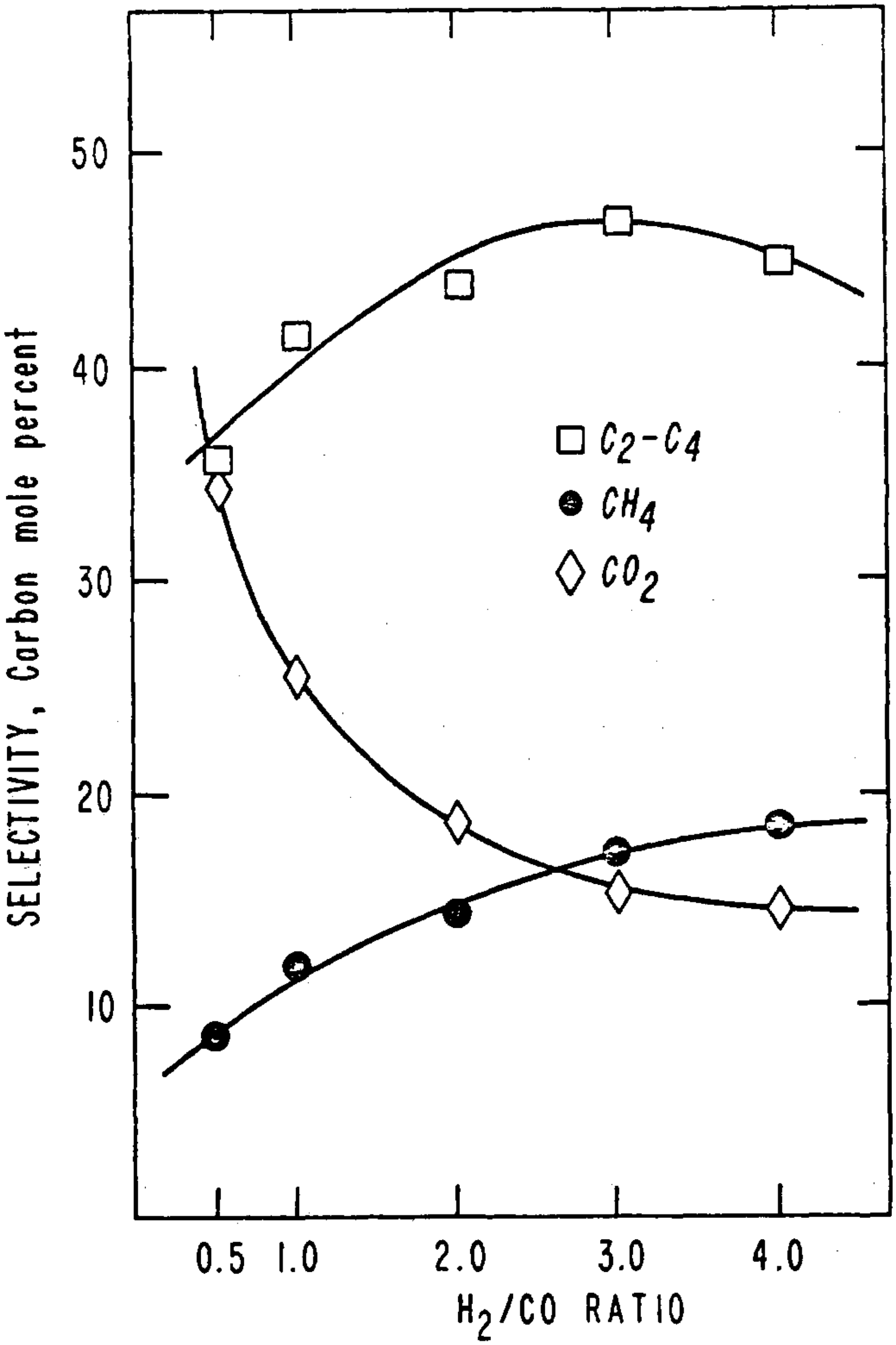

50
40
30
20
10
SELECTIVITY, Carbon mole percent
0.5
1.0
2.0
3.0
4.0
H2/CO RATIO
C2-C4
CH4
CO2

Figure 70

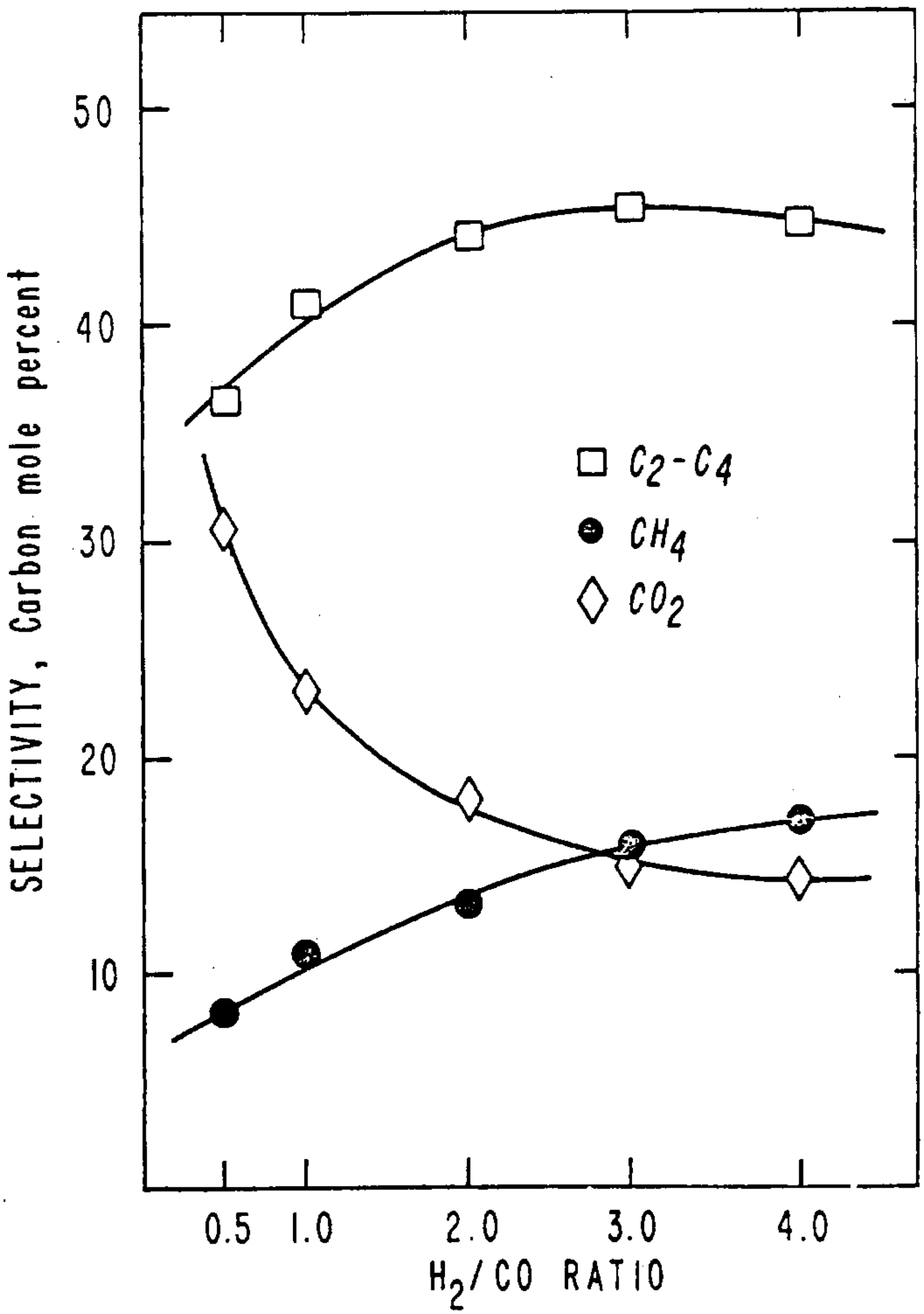
Effect of H_2/CO Ratio on Product Distribution

Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K; Pressure = 3200 KPa;

Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 cm^3s^{-1}.



50
40
30
20
10
SELECTIVITY, Carbon mole percent
C2-C4
CH4
CO2
0.5
1.0
2.0
3.0
4.0
H2/CO RATIO

Figure 71

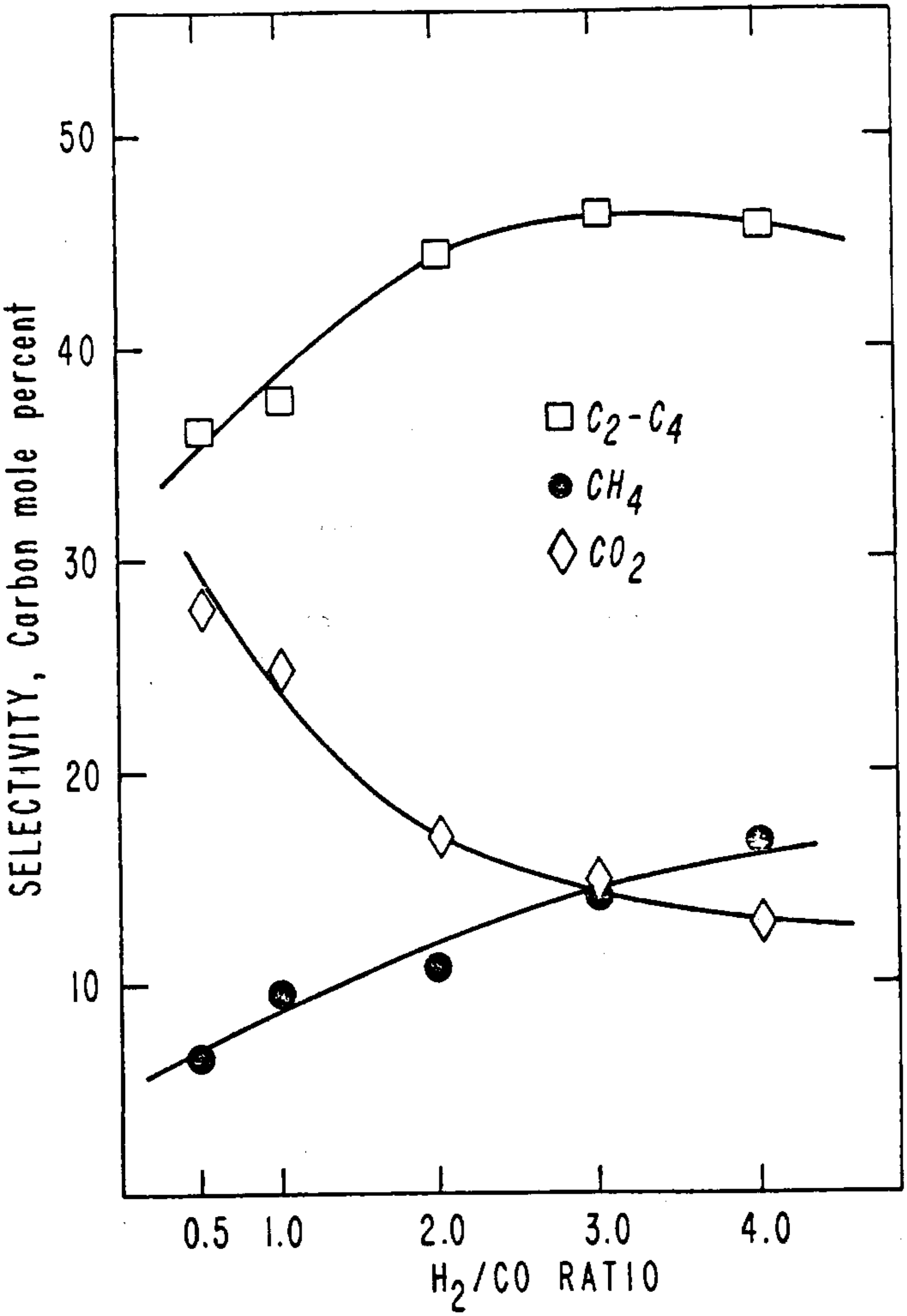
Effect of H_2/CO Ratio on Product Distribution

Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K; Pressure = 4400 KPa;

Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 cm^3s^{-1}.



50
40
30
20
10
SELECTIVITY, Carbon mole percent
C_2-C_4
CH_4
CO_2
0.5
1.0
2.0
3.0
4.0
H_2/CO RATIO

increased as the hydrogen-to-carbon monoxide ratio of the reactant gas increased at constant pressure and decreased with increasing pressure at constant hydrogen-to-carbon monoxide ratio. The yield of C_2-C_4 hydrocarbons increased with increasing hydrogen to carbon monoxide ratios up to a ratio of 3/1, at all pressures investigated. The yield appeared to run through a maximum at 3/1 and decreased at higher ratios. The effect of the hydrogen to carbon monoxide ratio of the reactant gas on olefin selectivity at different reactor pressures is presented in Figure 72 through Figure 76. At all pressures investigated, the olefin to paraffin ratio of the C_2-C_4 hydrocarbon fraction decreased as the hydrogen-to-carbon monoxide ratio increased at constant pressure and decreased as the reactor pressure increased at constant hydrogen to carbon monoxide ratio. The olefin-to-paraffin ratio of the C_3 hydrocarbon fraction was consistently higher than that of the C_4 hydrocarbon fraction at all pressures and hydrogen-to-carbon monoxide ratios studied. The olefin-to-paraffin ratio of the C_3 and C_4 hydrocarbon fraction decreased as the pressure increased for all hydrogen-to-carbon monoxide ratios. The olefin-to-paraffin ratio of the C_2 hydrocarbon fraction decreased with increasing hydrogen-to-carbon monoxide ratio at constant pressure and increased with increasing pressure at constant hydrogen-to-carbon monoxide ratios above 2/1. The data used to plot the figures in this section are listed in Table H-1 through Table H-16 in Appendix H.

Figure 72

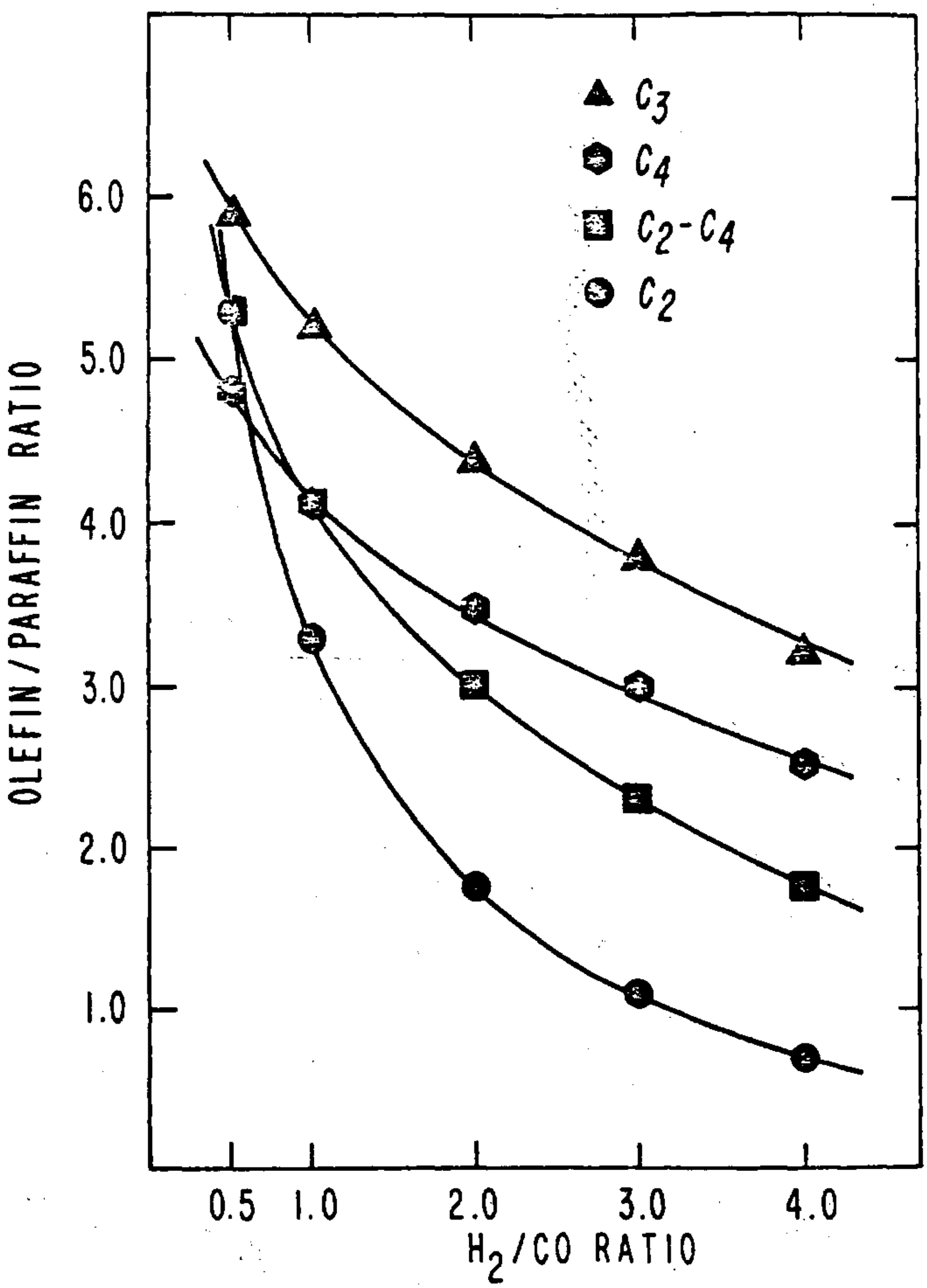
Effect of H_2/CO Ratio on Olefin Selectivity

Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K; Pressure = 1400 KPa;

Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 cm^3s^{-1}.



C3
C4
C2-C4
C2
6.0
5.0
4.0
3.0
2.0
1.0
OLEFIN/PARAFFIN RATIO
0.5
1.0
2.0
3.0
4.0
H2/CO RATIO

Figure 73

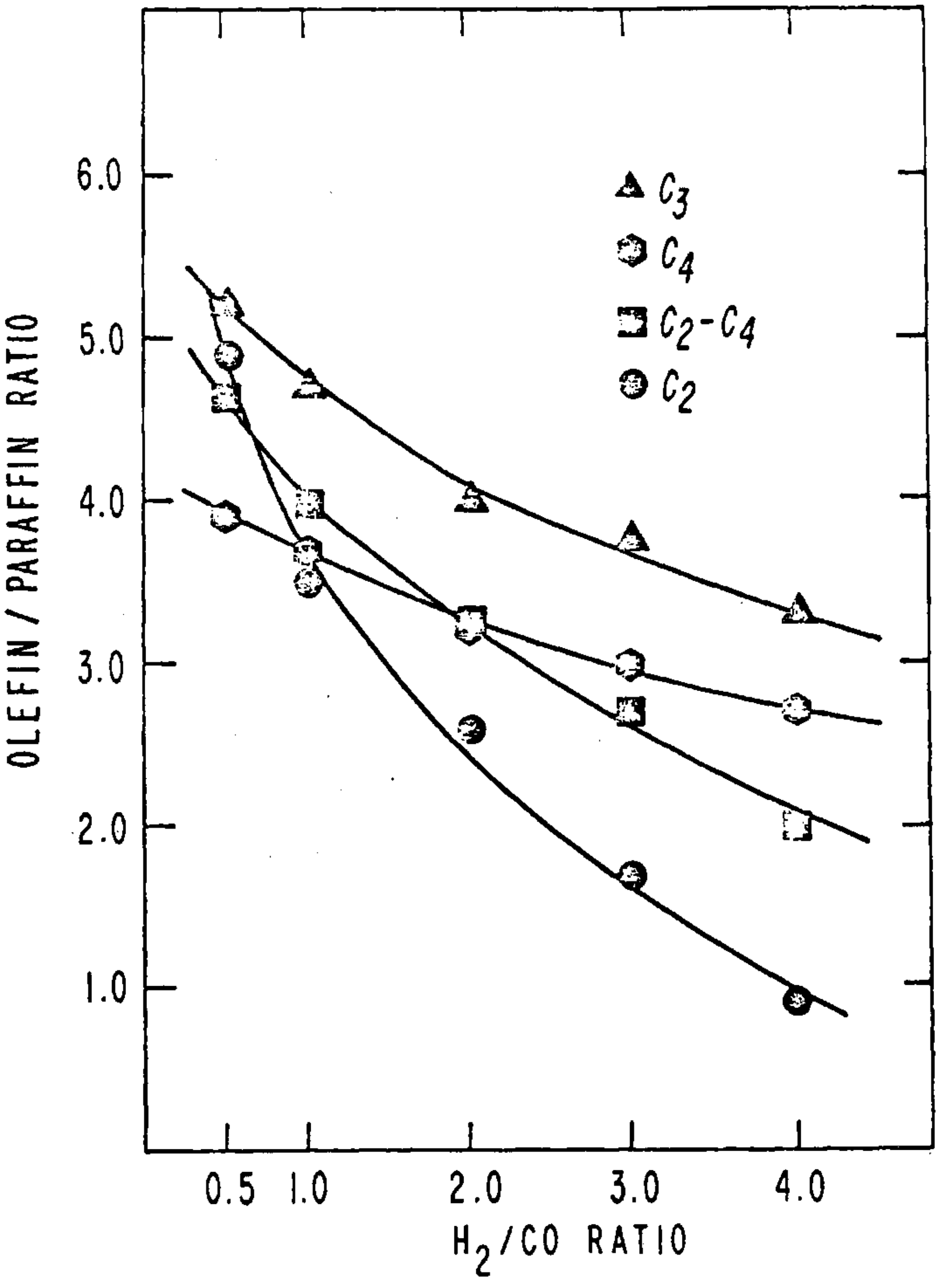
Effect of H_2/CO Ratio on Olefin Selectivity

Diluted Bed, Pseudo Slurry Reactor

Temperature = 503 K; Pressure = 2000 KPa;

Space Velocity = 1 $cm^3g^{-1}s^{-1}$;

Heat Transfer Liquid Flow Rate (n-C16) = 0.103 cm^3s^{-1}


C3
C4
C2-C4
C2
6.0
5.0
4.0
3.0
2.0
1.0
OLEFIN / PARAFFIN RATIO
0.5
1.0
2.0
3.0
4.0
H2/CO RATIO