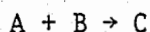


Example Problem

A catalytic reaction



has been studied in a constant volume 1 liter batch reactor. Below is data on the partial pressure of A & B versus time in this reactor. For convenience plots are also provided. C is known to be only weakly adsorbed. The temperature is constant and diffusion limitations are small.

A. From the qualitative aspects of the data, discuss whether or not it is possible that the reaction is

1. Competitive single site adsorption of A & B.
2. Dual site adsorption of A & B.
3. Eley-Rideal mechanism.

B. Pick one of the possible mechanisms above and find rough values for as many parameters as you can.

Note: It is easiest if you make rate constants in torr/lt-sec and equilibrium adsorption constants in torr⁻¹.

<u>P_A (torr)</u>	<u>P_B (torr)</u>	<u>time (min)</u>
100.0	100.0	0
90.1	90.1	6.1
80.1	80.1	12.5
70.1	70.1	19.2
60.1	60.1	26.3
50.1	50.1	34.0
40.1	40.1	42.8
30.1	30.1	53.1
20.1	20.1	66.8
10.1	10.1	90.7

<u>P_A (torr)</u>	<u>P_B (torr)</u>	<u>time (min)</u>
100.0	200.0	0
90.1	190.1	6.9
80.1	180.1	14.1
70.1	170.1	21.7
60.1	160.1	29.9
50.1	150.1	38.8
40.1	140.1	48.8
30.1	130.1	60.5
20.1	120.1	75.3
10.1	110.1	97.8
100.0	300.0	0
90.1	290.1	8.2
80.1	280.1	16.9
70.1	270.1	26.3
60.1	260.1	36.4
50.1	250.1	47.7
40.1	240.1	60.7
30.1	230.1	76.3
20.1	220.1	96.6
10.1	210.1	128.7
100.0	400.0	0
90.1	390.1	9.7
80.1	380.1	20.0
70.1	370.1	31.2
60.1	360.1	43.6
50.1	350.1	57.5
40.1	340.1	73.6
30.1	330.1	93.3
20.1	320.1	119.5
10.1	310.1	161.6
100.0	500.0	0
90.1	490.1	11.2
80.1	480.1	23.2
70.1	470.1	36.3
60.1	460.1	50.9
50.1	450.1	67.5
40.1	440.1	86.9
30.1	430.1	110.8
20.1	420.1	143.0
10.1	410.1	195.3

<u>P_A (torr)</u>	<u>P_B (torr)</u>	<u>time(min)</u>
200.0	100.0	0
190.1	90.1	5.4
180.1	80.1	11.0
170.1	70.1	16.8
160.1	60.1	22.8
150.1	50.1	29.3
140.1	40.1	36.4
130.1	30.1	44.3
120.1	20.1	54.0
110.1	10.1	68.0
300.0	100.0	0
290.1	90.1	5.7
280.1	80.1	11.5
270.1	70.1	17.7
260.1	60.1	24.3
250.1	50.1	31.5
240.1	40.1	39.4
230.1	30.1	48.7
220.1	20.1	60.4
210.1	10.1	77.9
400.0	100.0	0
390.1	90.1	6.1
380.1	80.1	12.6
370.1	70.1	19.4
360.1	60.1	26.8
350.1	50.1	34.9
340.1	40.1	44.1
330.1	30.1	55.1
320.1	20.1	69.2
310.1	10.1	91.0
500.0	100.0	0
490.1	90.1	6.7
480.1	80.1	13.8
470.1	70.1	21.4
460.1	60.1	29.7
450.1	50.1	38.9
440.1	40.1	49.5
430.1	30.1	62.2
420.1	20.1	78.8
410.1	10.1	105.1

