Ernesto Silva	
Engr 115	
1/4/2016	

Input Parameters:	
Measured C Outdoor (ppm)	389.5
Assumed C Outdoor (ppm)	400
Ciorrection Factor (ppm)	10.5
Room Volume (ft3)	2194.5
Room Capacity (people)	6

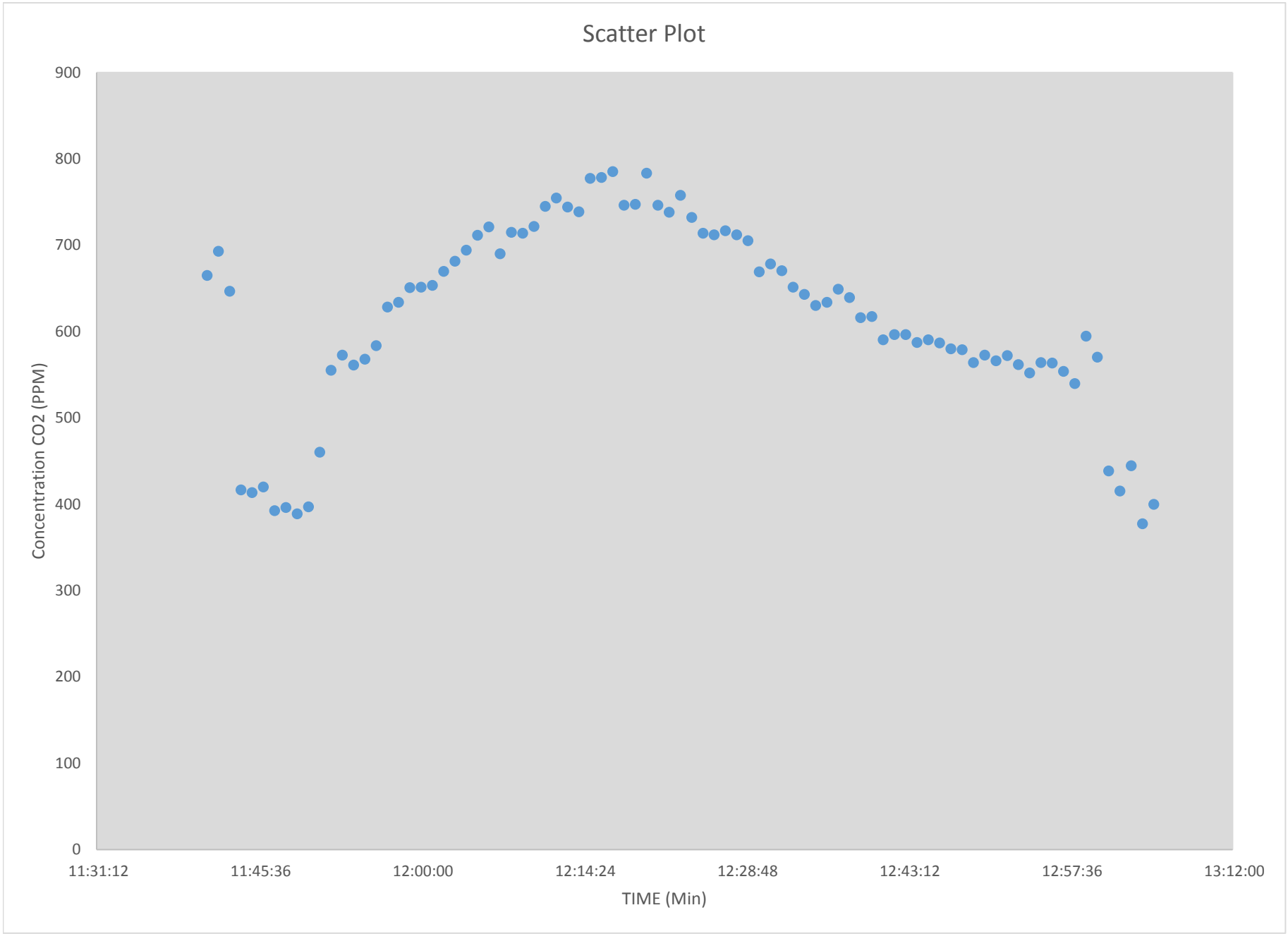
Calculations:	
Air Exchange Rate (1/hr)	0.6749
Time to remove chemical (hr)	4.445102978
Ventilation Rate (ft3/min/person)	4.114077917

Measurment	Date Time	Actual CO2 Concentrations
0	4/1/2016 12:17:00	785.2
1	4/1/2016 12:18:00	746.2
2	4/1/2016 12:19:00	747.4
3	4/1/2016 12:20:00	783.4
4	4/1/2016 12:21:00	746.2
5	4/1/2016 12:22:00	738.2
6	4/1/2016 12:23:00	757.8
7	4/1/2016 12:24:00	732.1
8	4/1/2016 12:25:00	713.8
9	4/1/2016 12:26:00	712
10	4/1/2016 12:27:00	716.8
11	4/1/2016 12:28:00	712
12	4/1/2016 12:29:00	705.2
13	4/1/2016 12:30:00	669.2
14	4/1/2016 12:31:00	678.4
15	4/1/2016 12:32:00	670.5
16	4/1/2016 12:33:00	651.5
17	4/1/2016 12:34:00	643
18	4/1/2016 12:35:00	630.2
19	4/1/2016 12:36:00	633.8
20	4/1/2016 12:37:00	649.1
21	4/1/2016 12:38:00	639.3
22	4/1/2016 12:39:00	616.1
23	4/1/2016 12:40:00	617.3
24	4/1/2016 12:41:00	590.5
25	4/1/2016 12:42:00	596.6
26	4/1/2016 12:43:00	596.6
27	4/1/2016 12:44:00	587.4
28	4/1/2016 12:45:00	590.5
29	4/1/2016 12:46:00	586.8
30	4/1/2016 12:47:00	580.1
31	4/1/2016 12:48:00	578.9
32	4/1/2016 12:49:00	564.2
33	4/1/2016 12:50:00	572.8

34	4/1/2016 12:51:00	566.1
35	4/1/2016 12:52:00	572.2
36	4/1/2016 12:53:00	561.8
37	4/1/2016 12:54:00	552
38	4/1/2016 12:55:00	564.2
39	4/1/2016 12:56:00	563.6
40	4/1/2016 12:57:00	553.8
41	4/1/2016 12:58:00	539.8

Hobo CO2 Concentrations	Experiment time (hr)	Natural Log Function
774.7	0	0
735.7	0.016666667	0.106746037
736.9	0.033333333	0.103285826
772.9	0.05	0.004683849
735.7	0.066666667	0.106746037
727.7	0.083333333	0.130125243
747.3	0.1	0.073788509
721.6	0.116666667	0.148326552
703.3	0.133333333	0.20500684
701.5	0.15	0.210759492
706.3	0.166666667	0.19549202
701.5	0.183333333	0.210759492
694.7	0.2	0.232795381
658.7	0.216666667	0.358308082
667.9	0.233333333	0.324703751
660	0.25	0.353490582
641	0.266666667	0.42631969
632.5	0.283333333	0.460701237
619.7	0.3	0.514814184
623.3	0.316666667	0.499296631
638.6	0.333333333	0.435908258
628.8	0.35	0.476044685
605.6	0.366666667	0.578021416
606.8	0.383333333	0.572483793
580	0.4	0.704110485
586.1	0.416666667	0.672591472
586.1	0.433333333	0.672591472
576.9	0.45	0.72051731
580	0.466666667	0.704110485
576.3	0.483333333	0.723724154
569.6	0.5	0.760250428
568.4	0.516666667	0.766935689
553.7	0.533333333	0.852677483
562.3	0.55	0.801627824

555.6	0.566666667	0.841172663
561.7	0.583333333	0.805106088
551.3	0.6	0.867401675
541.5	0.616666667	0.929882159
553.7	0.633333333	0.852677483
553.1	0.65	0.856338256
543.3	0.666666667	0.918109623
529.3	0.683333333	1.01354985


Scatter Plot
900
800
700
600
500
400
300
200
100
0
Concentration CO2 (PPM)
11:31:12
11:45:36
12:00:00
12:14:24
12:28:48
12:43:12
12:57:36
13:12:00
TIME (Min)

Ernesto Silva
Engr 115
1/4/2016

Input Parameters	
Measured C Outdoor (ppm)	389.5
Assumed C Outdoor (ppm)	400
Ciorrection Factor (ppm)	10.5

Measurment	Date Time	Actual CO2 Concentrations
1	4/1/2016 11:41:00	665
2	4/1/2016 11:42:00	693
3	4/1/2016 11:43:00	646.6
4	4/1/2016 11:44:00	416.5
5	4/1/2016 11:45:00	413.4
6	4/1/2016 11:46:00	420.1
7	4/1/2016 11:47:00	392.7
8	4/1/2016 11:48:00	396.3
9	4/1/2016 11:49:00	389
10	4/1/2016 11:50:00	396.9
11	4/1/2016 11:51:00	460.4
12	4/1/2016 11:52:00	555.1
13	4/1/2016 11:53:00	572.8
14	4/1/2016 11:54:00	561.2
15	4/1/2016 11:55:00	567.9
16	4/1/2016 11:56:00	583.8
17	4/1/2016 11:57:00	628.3
18	4/1/2016 11:58:00	633.8
19	4/1/2016 11:59:00	650.9
20	4/1/2016 12:00:00	651.5
21	4/1/2016 12:01:00	653.4
22	4/1/2016 12:02:00	669.8
23	4/1/2016 12:03:00	681.4
24	4/1/2016 12:04:00	694.3
25	4/1/2016 12:05:00	711.4
26	4/1/2016 12:06:00	721.1
27	4/1/2016 12:07:00	690
28	4/1/2016 12:08:00	715
29	4/1/2016 12:09:00	713.8
30	4/1/2016 12:10:00	721.7
31	4/1/2016 12:11:00	744.9
32	4/1/2016 12:12:00	754.7
33	4/1/2016 12:13:00	744.3
34	4/1/2016 12:14:00	738.8
35	4/1/2016 12:15:00	777.3
36	4/1/2016 12:16:00	778.5

37	4/1/2016 12:17:00	785.2
38	4/1/2016 12:18:00	746.2
39	4/1/2016 12:19:00	747.4
40	4/1/2016 12:20:00	783.4
41	4/1/2016 12:21:00	746.2
42	4/1/2016 12:22:00	738.2
43	4/1/2016 12:23:00	757.8
44	4/1/2016 12:24:00	732.1
45	4/1/2016 12:25:00	713.8
46	4/1/2016 12:26:00	712
47	4/1/2016 12:27:00	716.8
48	4/1/2016 12:28:00	712
49	4/1/2016 12:29:00	705.2
50	4/1/2016 12:30:00	669.2
51	4/1/2016 12:31:00	678.4
52	4/1/2016 12:32:00	670.5
53	4/1/2016 12:33:00	651.5
54	4/1/2016 12:34:00	643
55	4/1/2016 12:35:00	630.2
56	4/1/2016 12:36:00	633.8
57	4/1/2016 12:37:00	649.1
58	4/1/2016 12:38:00	639.3
59	4/1/2016 12:39:00	616.1
60	4/1/2016 12:40:00	617.3
61	4/1/2016 12:41:00	590.5
62	4/1/2016 12:42:00	596.6
63	4/1/2016 12:43:00	596.6
64	4/1/2016 12:44:00	587.4
65	4/1/2016 12:45:00	590.5
66	4/1/2016 12:46:00	586.8
67	4/1/2016 12:47:00	580.1
68	4/1/2016 12:48:00	578.9
69	4/1/2016 12:49:00	564.2
70	4/1/2016 12:50:00	572.8
71	4/1/2016 12:51:00	566.1
72	4/1/2016 12:52:00	572.2
73	4/1/2016 12:53:00	561.8
74	4/1/2016 12:54:00	552
75	4/1/2016 12:55:00	564.2
76	4/1/2016 12:56:00	563.6
77	4/1/2016 12:57:00	553.8
78	4/1/2016 12:58:00	539.8
79	4/1/2016 12:59:00	594.7
80	4/1/2016 13:00:00	570.3
81	4/1/2016 13:01:00	438.5
82	4/1/2016 13:02:00	415.3
83	4/1/2016 13:03:00	444.6
84	4/1/2016 13:04:00	377.4
85	4/1/2016 13:05:00	400
86	4/1/2016 13:05:00	
87	4/1/2016 13:06:00	

Hobo CO2 Concentrations
654.5
682.5
636.1
406
402.9
409.6
382.2
385.8
378.5
386.4
449.9
544.6
562.3
550.7
557.4
573.3
617.8
623.3
640.4
641
642.9
659.3
670.9
683.8
700.9
710.6
679.5
704.5
703.3
711.2
734.4
744.2
733.8
728.3
766.8
768

774.7
735.7
736.9
772.9
735.7
727.7
747.3
721.6
703.3
701.5
706.3
701.5
694.7
658.7
667.9
660
641
632.5
619.7
623.3
638.6
628.8
605.6
606.8
580
586.1
586.1
576.9
580
576.3
569.6
568.4
553.7
562.3
555.6
561.7
551.3
541.5
553.7
553.1
543.3
529.3
584.2
559.8
428
404.8
434.1
366.9
389.5

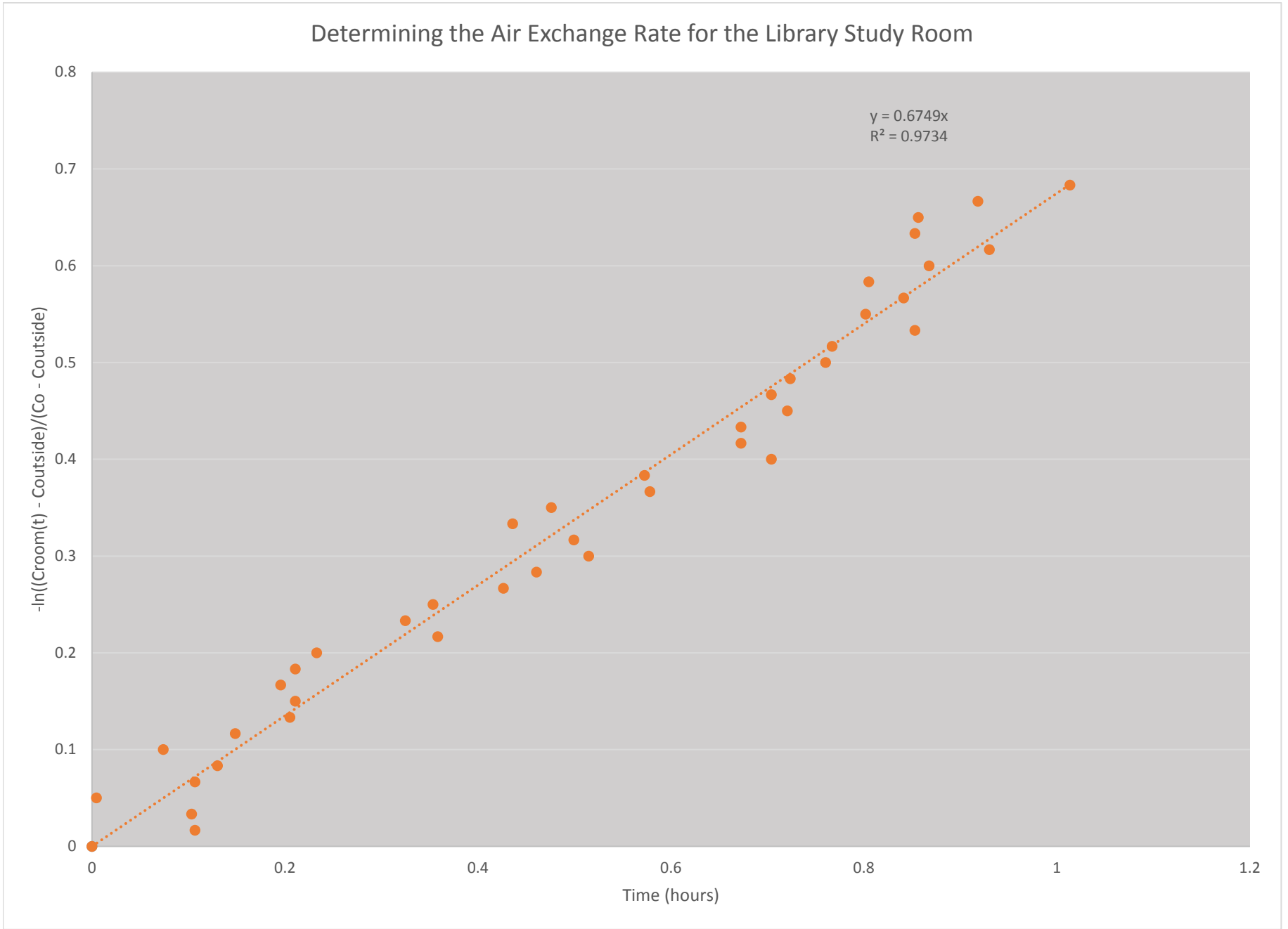
Plot Title: Library 312

#	Date Time, GMT-07:00	CO2, ppm (LGR S/N: 97	Host Connected (	Stopped (LGR S/I
1	4/1/2016 11:41:00	654.5		
2	4/1/2016 11:42:00	682.5		
3	4/1/2016 11:43:00	636.1		
4	4/1/2016 11:44:00	406		
5	4/1/2016 11:45:00	402.9		
6	4/1/2016 11:46:00	409.6		
7	4/1/2016 11:47:00	382.2		
8	4/1/2016 11:48:00	385.8		
9	4/1/2016 11:49:00	378.5		
10	4/1/2016 11:50:00	386.4		
11	4/1/2016 11:51:00	449.9		
12	4/1/2016 11:52:00	544.6		
13	4/1/2016 11:53:00	562.3		
14	4/1/2016 11:54:00	550.7		
15	4/1/2016 11:55:00	557.4		
16	4/1/2016 11:56:00	573.3		
17	4/1/2016 11:57:00	617.8		
18	4/1/2016 11:58:00	623.3		
19	4/1/2016 11:59:00	640.4		
20	4/1/2016 12:00:00	641		
21	4/1/2016 12:01:00	642.9		
22	4/1/2016 12:02:00	659.3		
23	4/1/2016 12:03:00	670.9		
24	4/1/2016 12:04:00	683.8		
25	4/1/2016 12:05:00	700.9		
26	4/1/2016 12:06:00	710.6		
27	4/1/2016 12:07:00	679.5		
28	4/1/2016 12:08:00	704.5		
29	4/1/2016 12:09:00	703.3		
30	4/1/2016 12:10:00	711.2		
31	4/1/2016 12:11:00	734.4		
32	4/1/2016 12:12:00	744.2		
33	4/1/2016 12:13:00	733.8		
34	4/1/2016 12:14:00	728.3		
35	4/1/2016 12:15:00	766.8		
36	4/1/2016 12:16:00	768		
37	4/1/2016 12:17:00	774.7		
38	4/1/2016 12:18:00	735.7		
39	4/1/2016 12:19:00	736.9		
40	4/1/2016 12:20:00	772.9		
41	4/1/2016 12:21:00	735.7		
42	4/1/2016 12:22:00	727.7		
43	4/1/2016 12:23:00	747.3		
44	4/1/2016 12:24:00	721.6		
45	4/1/2016 12:25:00	703.3		

46	4/1/2016 12:26:00	701.5		
47	4/1/2016 12:27:00	706.3		
48	4/1/2016 12:28:00	701.5		
49	4/1/2016 12:29:00	694.7		
50	4/1/2016 12:30:00	658.7		
51	4/1/2016 12:31:00	667.9		
52	4/1/2016 12:32:00	660		
53	4/1/2016 12:33:00	641		
54	4/1/2016 12:34:00	632.5		
55	4/1/2016 12:35:00	619.7		
56	4/1/2016 12:36:00	623.3		
57	4/1/2016 12:37:00	638.6		
58	4/1/2016 12:38:00	628.8		
59	4/1/2016 12:39:00	605.6		
60	4/1/2016 12:40:00	606.8		
61	4/1/2016 12:41:00	580		
62	4/1/2016 12:42:00	586.1		
63	4/1/2016 12:43:00	586.1		
64	4/1/2016 12:44:00	576.9		
65	4/1/2016 12:45:00	580		
66	4/1/2016 12:46:00	576.3		
67	4/1/2016 12:47:00	569.6		
68	4/1/2016 12:48:00	568.4		
69	4/1/2016 12:49:00	553.7		
70	4/1/2016 12:50:00	562.3		
71	4/1/2016 12:51:00	555.6		
72	4/1/2016 12:52:00	561.7		
73	4/1/2016 12:53:00	551.3		
74	4/1/2016 12:54:00	541.5		
75	4/1/2016 12:55:00	553.7		
76	4/1/2016 12:56:00	553.1		
77	4/1/2016 12:57:00	543.3		
78	4/1/2016 12:58:00	529.3		
79	4/1/2016 12:59:00	584.2		
80	4/1/2016 13:00:00	559.8		
81	4/1/2016 13:01:00	428		
82	4/1/2016 13:02:00	404.8		
83	4/1/2016 13:03:00	434.1		
84	4/1/2016 13:04:00	366.9		
85	4/1/2016 13:05:00	389.5		
86	4/1/2016 13:05:00		Logged	
87	4/1/2016 13:06:00			Logged

End Of File (LGR S/N: 9789942)

Logged


Determining the Air Exchange Rate for the Library Study Room
y = 0.6749x
R² = 0.9734
-ln((Croom(t) - Coutside)/(Co - Coutside)
Time (hours)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
0.2
0.4
0.6
0.8
1
1.2

What is the air exchange rate (λ) of the room you tested? Be sure to include the units for the air exchange rate in your answer

In general it takes 3/λ hours to remove a non-reactive chemical from indoor air. Based on this time, what recommendations would you make to the occupants of the room?

Compare your ventilation rate for a typical number of occupants to the ASHRAE recommended ventilation rate. Based on this comparison, are the occupants wasting energy heating and cooling the air or are the occupants being too cheap and not supplying enough air? Justify your answer.

Given the ASHRAE standard ventilation standard, what is the maximum number of people you would recommend having in this room at one time? Use your model to determine this number.

The air exchange rate for my room was 0.6749/hr.

Based on my data it would take about 4.4 hours for the chemical to exit the room. So I would recommend that the ocupants of this room maintain as high amount of ventilation as possible. Having a window or door open at all times would be ideal. As well as not staying in the room for an exteneded amount of time at once.

When comparing my ventilation rate to the ASHRAE recommnded ventilation rate, I notice that my rate is a lot lower than the recommended. Based on that I think the occupants are being to cheap and not supplying enough air to the room. I believe this becasue the venitlation rate of the room, of 4.1 ft3/min/person is not even relatively close to the standard ventilation rate. the room needs more air flowing through it to get its ventilation rate up, or the number of occupants needs to reduce.

I would recommend that the maximum number of people in the room at one time should be 2. If two people are in the room the ventilation rate is around 12 ft 3/min/person, which is not exactly the standard rate but a lot closer. The ideal number of people in the room at once however should be 1 in order to exceed the recommended ventilation rate.