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ENGR 115  
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## Air Exchange Analysis

### **Introduction:**

The purpose of this experiment was to investigate the air exchange rate of any small room on Humboldt State University's campus. This experiment was composed in the dorm room of a student at Humboldt State University. This information displays the results used in order to calculate the air exchange rate of the room of the experiment.

### **Materials and Methods:**

These results are based on an experiment in which a group of six students placed a Hobo meter in a room, and situated the room until the meter reached 1500 ppm. Then the students left the room and waited out the next 45 minutes allowing the results to compile. \*The only measurements that were changed from the original study, is that this group waited until the meter was at 1600 ppm. The materials used were a Hobo meter, the students, and a timer. The estimated capacity of the room is two people.

### **Results:**

All the relevant results from the experiment are in the Air Exchange Analysis Spreadsheet. These results display the high level of CO<sub>2</sub> (ppm) the experiment began with. The calculated air exchange rate was 0.2591. The ventilation rate of the room was 2.778 seen in the calculations. It's estimated that with the current rates, it would take almost four hours for the room to be cleared of the CO<sub>2</sub> that was brought in. The Concentration Analysis Plot, displays the trend that's shown in the numerical data, while also showing the linear decay of CO<sub>2</sub> as it exits the room. All results are displayed at the end of the Laboratory memo.

### **Discussion:**

These results were successful in that it displayed realistic numerical values. There were not any major errors in the experiment and the experiment went smoothly from beginning to end. The data that's shown supports the claim that the dorm rooms can be congested and filled with high levels of carbon dioxide.

### **Conclusion:**

From the results, it's known that the dorm room of study was unsuitable without proper ventilation; such as an open window. Without any ventilation, these are unsuitable living conditions for any human. The ventilation rate of 2.778 and air exchange rate of 0.2591 are not ideal conditions for living, even for two people. Without changing the ventilation of the room, the dormitories at Sunset on Humboldt State University's campus will continue to be unsuitable.

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Input Parameters:

Measured Coutdoor (ppm)	800
Assumed Coutdoor (ppm)	400
Correction Factor (ppm)	400
Room Volume (ft3)	1287
Room Capacity (people)	2

Calculations:

Air Exchange Rate	0.2591
Time to remove non-reactive chemical (hr)	3.8595
Ventilation Rate (ft3/min/person)	2.7788

Analysis:

Measurement	Time	Concentration(	Concentration	Time (hr)	Coutdoor)/(Co-Coutdoor
0	9:20:57 AM	1625.8	1225.8	0.000	0.000
1	9:21:57 AM	1616.6	1216.6	0.017	0.011
2	9:22:57 AM	1606.8	1206.8	0.033	0.023
3	9:23:57 AM	1595.2	1195.2	0.050	0.038
4	9:24:57 AM	1589.1	1189.1	0.067	0.045
5	9:25:57 AM	1592.2	1192.2	0.083	0.042
6	9:26:57 AM	1594.6	1194.6	0.100	0.039
7	9:27:57 AM	1591	1191	0.117	0.043
8	9:28:57 AM	1582.4	1182.4	0.133	0.054
9	9:29:57 AM	1584.2	1184.2	0.150	0.052
10	9:30:57 AM	1582.4	1182.4	0.167	0.054
11	9:31:57 AM	1584.9	1184.9	0.183	0.051
12	9:32:57 AM	1588.5	1188.5	0.200	0.046
13	9:33:57 AM	1586.7	1186.7	0.217	0.049
14	9:34:57 AM	1573.3	1173.3	0.233	0.066
15	9:35:57 AM	1567.8	1167.8	0.250	0.073
16	9:36:57 AM	1563.5	1163.5	0.267	0.078
17	9:37:57 AM	1563.5	1163.5	0.283	0.078
18	9:38:57 AM	1564.1	1164.1	0.300	0.078
19	9:39:57 AM	1560.4	1160.4	0.317	0.083
20	9:40:57 AM	1553.7	1153.7	0.333	0.091
21	9:41:57 AM	1536	1136	0.350	0.115
22	9:42:57 AM	1534.2	1134.2	0.367	0.118
23	9:43:57 AM	1531.1	1131.1	0.383	0.122
24	9:44:57 AM	1531.7	1131.7	0.400	0.121
25	9:45:57 AM	1531.1	1131.1	0.417	0.122
26	9:46:57 AM	1529.3	1129.3	0.433	0.124
27	9:47:57 AM	1528.7	1128.7	0.450	0.125
28	9:48:57 AM	1523.8	1123.8	0.467	0.132
29	9:49:57 AM	1520.8	1120.8	0.483	0.136
30	9:50:57 AM	1522.6	1122.6	0.500	0.133
31	9:51:57 AM	1522	1122	0.517	0.134
32	9:52:57 AM	1520.8	1120.8	0.533	0.136
33	9:53:57 AM	1520.8	1120.8	0.550	0.136
34	9:54:57 AM	1520.8	1120.8	0.567	0.136
35	9:55:57 AM	1521.4	1121.4	0.583	0.135
36	9:56:57 AM	1522	1122	0.600	0.134
37	9:57:57 AM	1514.7	1114.7	0.617	0.144
38	9:58:57 AM	1511.6	1111.6	0.633	0.149
39	9:59:57 AM	1506.1	1106.1	0.650	0.157
40	10:00:57 AM	1504.3	1104.3	0.667	0.159
41	10:01:57 AM	1504.3	1104.3	0.683	0.159

Concentration Analysis Plot

