

Chart Tools: Layout, Format

Chart Area: Format Selection, Reset to Match Style, Current Selection

Insert: Picture, Shapes, Text Box

Labels: Chart Title, Axis Titles, Legend, Data Labels, Data Table

Axes: Axes, Gridlines

Background: Plot Area, Chart Wall, Chart Floor, 3-D Rotation

Analysis: Trendline, Lines, Up/Down Bars, Error Bars

Chart Name: Chart 2

Properties

Chart 2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
4	t	y																			
5		0																			
6	1	591.0893																			
7	2	1164.709																			
8	3	1721.376																			
9	4	2261.591																			
10	5	2785.84																			
11	6	3294.596																			
12	7	3788.315																			
13	8	4267.443																			
14	9	4732.41																			
15	10	5183.636																			
16	11	5621.525																			
17	12	6046.473																			
18	13	6458.863																			
19	14	6859.064																			
20	15	7247.437																			
21	16	7624.332																			
22	17	7990.088																			
23	18	8345.035																			
24	19	8689.491																			
25	20	9023.767																			
26	21	9348.164																			
27	22	9662.973																			
28	23	9968.479																			

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28	23	9968.479																			
29	24	10264.95																			
30	25	10552.67																			
31	26	10831.88																			
32	27	11102.84																			
33	28	11365.79																			
34	29	11620.97																			
35	30	11868.61																			
36	31	12108.93																			
37	32	12342.14																			
38	33	12568.47																			
39	34	12788.1																			
40	35	13001.25																			
41	36	13208.09																			
42	37	13408.82																			
43	38	13603.62																			
44	39	13792.66																			
45	40	13976.12																			
46	41	14154.15																			
47	42	14326.92																			
48	43	14494.58																			
49	44	14657.29																			
50	45	14815.19																			
51	46	14968.43																			
52	47	15117.13																			

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52	47	15117.13																			
53	48	15261.44																			
54	49	15401.49																			
55	50	15537.4																			
56	51	15669.29																			
57	52	15797.28																			
58	53	15921.49																			
59	54	16042.03																			
60	55	16159																			
61	56	16272.52																			
62	57	16382.68																			
63	58	16489.59																			
64	59	16593.34																			
65	60	16694.02																			
66	61	16791.73																			
67	62	16886.55																			
68	63	16978.56																			
69	64	17067.86																			
70	65	17154.52																			
71	66	17238.62																			
72	67	17320.23																			
73	68	17399.43																			
74	69	17476.28																			
75	70	17550.87																			
76	71	17623.25																			

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76	71	17623.25																			
77	72	17693.5																			
78	73	17761.67																			
79	74	17827.82																			
80	75	17892.02																			
81	76	17954.32																			
82	77	18014.77																			
83	78	18073.45																			
84	79	18130.39																			
85	80	18185.64																			
86	81	18239.26																			
87	82	18291.3																			
88	83	18341.8																			
89	84	18390.81																			
90	85	18438.37																			
91	86	18484.52																			
92	87	18529.31																			
93	88	18572.77																			
94	89	18614.96																			
95	90	18655.89																			
96	91	18695.61																			
97	92	18734.16																			
98	93	18771.58																			
99	94	18807.88																			
100	95	18843.11																			

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100	95	18843.11																			
101	96	18877.3																			
102	97	18910.49																			
103	98	18942.69																			
104	99	18973.93																			
105	100	19004.26																			
106	101	19033.69																			
107	102	19062.25																			
108	103	19089.96																			
109	104	19116.86																			
110	105	19142.96																			
111	106	19168.29																			
112	107	19192.87																			
113	108	19216.72																			
114	109	19239.87																			
115	110	19262.34																			
116	111	19284.14																			
117	112	19305.29																			
118	113	19325.83																			
119	114	19345.75																			
120	115	19365.09																			
121	116	19383.85																			
122	117	19402.06																			
123	118	19419.73																			
124	119	19436.88																			

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124	119	19436.88																			
125	120	19453.53																			
126	121	19469.68																			
127	122	19485.35																			
128	123	19500.56																			
129	124	19515.32																			
130	125	19529.65																			
131	126	19543.55																			
132	127	19557.04																			
133	128	19570.13																			
134	129	19582.83																			
135	130	19595.16																			
136	131	19607.13																			
137	132	19618.74																			
138	133	19630.01																			
139	134	19640.94																			
140	135	19651.55																			
141	136	19661.85																			
142	137	19671.84																			
143	138	19681.54																			
144	139	19690.95																			
145	140	19700.09																			
146	141	19708.95																			
147	142	19717.55																			
148	143	19725.9																			

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Properties

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
148	143	19725.9																			
149	144	19734																			
150	145	19741.86																			
151	146	19749.49																			
152	147	19756.9																			
153	148	19764.08																			
154	149	19771.05																			
155	150	19777.82																			
156	151	19784.39																			
157	152	19790.76																			
158	153	19796.94																			
159	154	19802.94																			
160	155	19808.77																			
161	156	19814.42																			
162	157	19819.9																			
163	158	19825.23																			
164	159	19830.39																			
165	160	19835.41																			
166	161	19840.27																			
167	162	19844.99																			
168	163	19849.57																			
169	164	19854.02																			
170	165	19858.33																			
171	166	19862.52																			
172	167	19866.58																			

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
172	167	19866.58																			
173	168	19870.53																			
174	169	19874.35																			
175	170	19878.07																			
176	171	19881.67																			
177	172	19885.17																			
178	173	19888.56																			
179	174	19891.85																			
180	175	19895.05																			
181	176	19898.15																			
182	177	19901.16																			
183	178	19904.08																			
184	179	19906.92																			
185	180	19909.67																			
186	181	19912.34																			
187	182	19914.93																			
188	183	19917.44																			
189	184	19919.88																			
190	185	19922.25																			
191	186	19924.55																			
192	187	19926.78																			
193	188	19928.94																			
194	189	19931.04																			
195	190	19933.08																			
196	191	19935.06																			

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196	191	19935.06																			
197	192	19936.98																			
198	193	19938.84																			
199	194	19940.65																			
200	195	19942.4																			
201	196	19944.1																			
202	197	19945.76																			
203	198	19947.36																			
204	199	19948.92																			
205	200	19950.42																			
206	201	19951.89																			
207	202	19953.31																			
208	203	19954.69																			
209	204	19956.03																			
210	205	19957.33																			
211	206	19958.59																			
212	207	19959.82																			
213	208	19961																			
214	209	19962.16																			
215	210	19963.27																			
216	211	19964.36																			
217	212	19965.41																			
218	213	19966.43																			
219	214	19967.43																			
220	215	19968.39																			

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220	215	19968.39																			
221	216	19969.32																			
222	217	19970.23																			
223	218	19971.11																			
224	219	19971.96																			
225	220	19972.79																			
226	221	19973.6																			
227	222	19974.38																			
228	223	19975.13																			
229	224	19975.87																			
230	225	19976.58																			
231	226	19977.27																			
232	227	19977.95																			
233	228	19978.6																			
234	229	19979.23																			
235	230	19979.84																			
236	231	19980.44																			
237	232	19981.02																			
238	233	19981.58																			
239	234	19982.12																			
240	235	19982.65																			
241	236	19983.16																			
242	237	19983.66																			
243	238	19984.14																			
244	239	19984.61																			

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
244	239	19984.61																			
245	240	19985.07																			
246	241	19985.51																			
247	242	19985.94																			
248	243	19986.35																			
249	244	19986.76																			
250	245	19987.15																			
251	246	19987.53																			
252	247	19987.9																			
253	248	19988.25																			
254	249	19988.6																			
255	250	19988.94																			
256	251	19989.27																			
257	252	19989.58																			
258	253	19989.89																			
259	254	19990.19																			
260	255	19990.48																			
261	256	19990.76																			
262	257	19991.03																			
263	258	19991.3																			
264	259	19991.56																			
265	260	19991.81																			
266	261	19992.05																			
267	262	19992.28																			
268	263	19992.51																			

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268	263	19992.51																			
269	264	19992.73																			
270	265	19992.95																			
271	266	19993.16																			
272	267	19993.36																			
273	268	19993.55																			
274	269	19993.74																			
275	270	19993.93																			
276	271	19994.11																			
277	272	19994.28																			
278	273	19994.45																			
279	274	19994.62																			
280	275	19994.77																			
281	276	19994.93																			
282	277	19995.08																			
283	278	19995.22																			
284	279	19995.37																			
285	280	19995.5																			
286	281	19995.64																			
287	282	19995.76																			
288	283	19995.89																			
289	284	19996.01																			
290	285	19996.13																			
291	286	19996.24																			
292	287	19996.35																			

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292	287	19996.35																			
293	288	19996.46																			
294	289	19996.57																			
295	290	19996.67																			
296	291	19996.77																			
297	292	19996.86																			
298	293	19996.96																			
299	294	19997.05																			
300	295	19997.13																			
301	296	19997.22																			
302	297	19997.3																			
303	298	19997.38																			
304	299	19997.46																			
305	300	19997.53																			
306	301	19997.6																			
307	302	19997.68																			
308	303	19997.74																			
309	304	19997.81																			
310	305	19997.88																			
311	306	19997.94																			
312	307	19998																			
313	308	19998.06																			
314	309	19998.12																			
315	310	19998.17																			
316	311	19998.23																			

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316	311	19998.23																			
317	312	19998.28																			
318	313	19998.33																			
319	314	19998.38																			
320	315	19998.43																			
321	316	19998.47																			
322	317	19998.52																			
323	318	19998.56																			
324	319	19998.6																			
325	320	19998.65																			
326	321	19998.69																			
327	322	19998.72																			
328	323	19998.76																			
329	324	19998.8																			
330	325	19998.83																			
331	326	19998.87																			
332	327	19998.9																			
333	328	19998.93																			
334	329	19998.97																			
335	330	19999																			
336	331	19999.03																			
337	332	19999.05																			
338	333	19999.08																			
339	334	19999.11																			
340	335	19999.14																			

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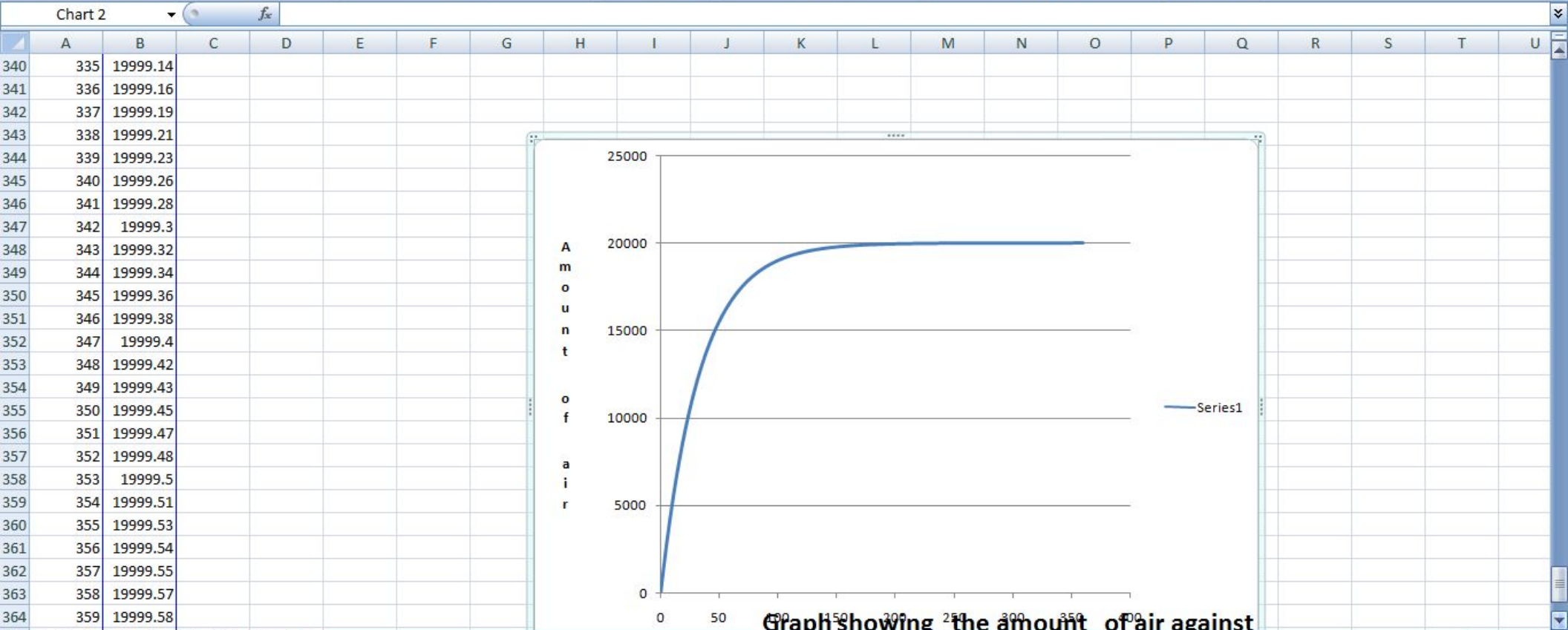


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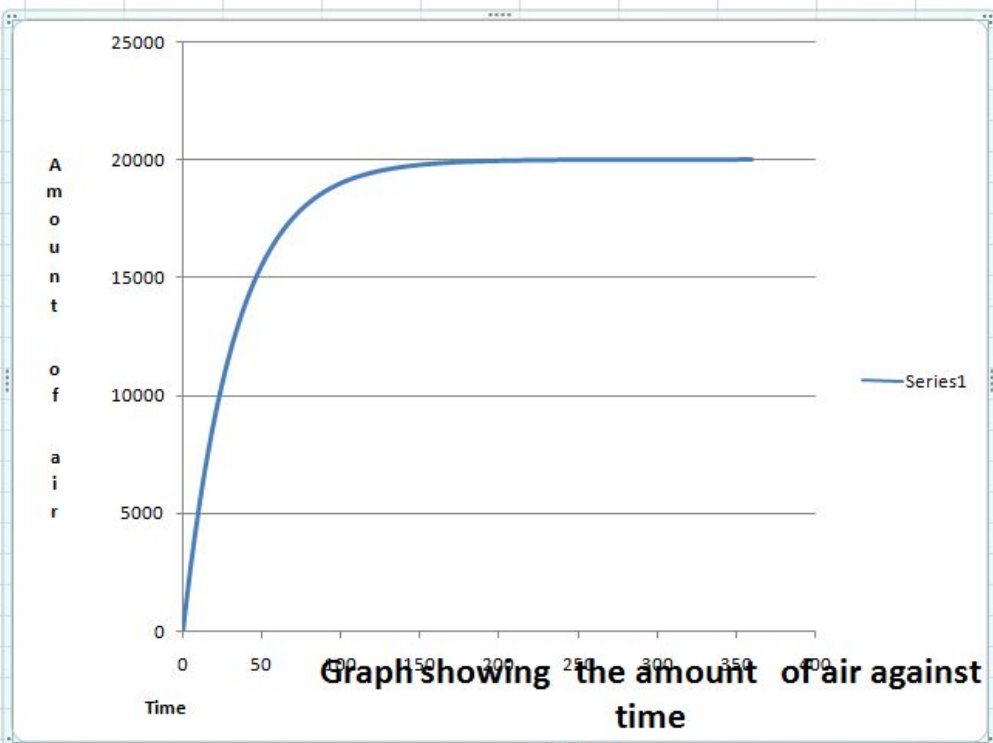
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342	337	19999.19
343	338	19999.21
344	339	19999.23
345	340	19999.26
346	341	19999.28
347	342	19999.3
348	343	19999.32
349	344	19999.34
350	345	19999.36
351	346	19999.38
352	347	19999.4
353	348	19999.42
354	349	19999.43
355	350	19999.45
356	351	19999.47
357	352	19999.48
358	353	19999.5
359	354	19999.51
360	355	19999.53
361	356	19999.54
362	357	19999.55
363	358	19999.57
364	359	19999.58
365	360	19999.59
366		



Name: Abdelim Fayour-C

Course: ENGT 282

Dept: Chemical Engineering

Matr No: 161EN001010

1. Initial air = $20,000 \text{ ft}^3$

Input of air = $600 \text{ ft}^3/\text{min}$

Rate = Inflow rate = $600 \text{ ft}^3/\text{min}$

Balance law \rightarrow rate of accumulation in the system = rate of Inflow - rate of outflow.

Let the amount of air at a time t = $y(t)$

$\frac{dy}{dt}$ = amount of material of y

rate of flow = y'

$\frac{dy}{dt} = y'_{in} - y'_{out}$

The outflow rate = $\frac{600}{20,000} = 0.03$

$\frac{dy}{dt} = 600 - 0.03y$

$\frac{dy}{dt} = -0.03y + 600$

$\frac{dy}{dt} = -0.03(y - 20,000)$

$\frac{dy}{y - 20,000} = -0.03 dt$

$\int \frac{1}{y - 20,000} = \int -0.03 dt$

$\ln|y - 20,000| = -0.03t + C$

$y - 20,000 = e^{-0.03t + C}$

$y - 20,000 = e^{-0.03t} \cdot e^C$

Let $e^C = y_0$

$y - 20,000 = y_0 e^{-0.03t}$

$y = 20,000 + y_0 e^{-0.03t}$

Q11

Name
Course
Mat No
Dept

Calculating for y_0 , If $t=0$

$$0 = 20000 + y_0 e^{-0.03t} \quad (1)$$

$$0 = 20000 + y_0$$

$$y_0 = -20000$$

$$\therefore y = 20000 - 20000 e^{-0.03t}$$

(b) Time taken for which 90% of air in room will become fresh

$$\text{Initial air} = 20,000$$

$$90 \times 20,000$$

$$18000 = 18000$$

$$18000 = 20000 - 20000 e^{-0.03t}$$

$$18000 - 20000 = -20000 e^{-0.03t}$$

$$-2000 = -20000 e^{-0.03t}$$

$$0.1 = e^{-0.03t}$$

$$\ln 0.1 = -0.03t$$

$$-2.30 = -0.03t$$

$$76.6 = t$$

$$t = 77 \text{ min}$$

d. The steady state value is 20000

(c) It was observed that the difference in the values of y was not much, on increase in time (t), led to an increase in y . When the graph was plotted, at a certain point there was no progression which is a steady state.