Decay Lab

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1 Introduction

Decay constant, proportionality between the size of a population of radioactive atoms and the rate at which the population decreases because of radioactive decay. Suppose N is the size of a population of radioactive atoms at a given time t, and dN is the amount by which the population decreases in time dt; then the rate of change is given by the equation dN/dt = N, where is the decay constant. Integration of this equation yields N = N0et, where N0 is the size of an initial population of radioactive atoms at time t =0 . This shows that the population decays exponentially at a rate that depends on the decay constant. The time required for half of the original population of radioactive atoms to decay is called the half-life.

2 Fomula

$$A = Aoe^{-kt}$$

A is the amount of atoms you start with; k is the constant of growth, and because of this is decay k is always negative that is the reason there is a minus symbol before k. t is the time of half life decay.

$$E = \frac{hc}{\lambda}$$

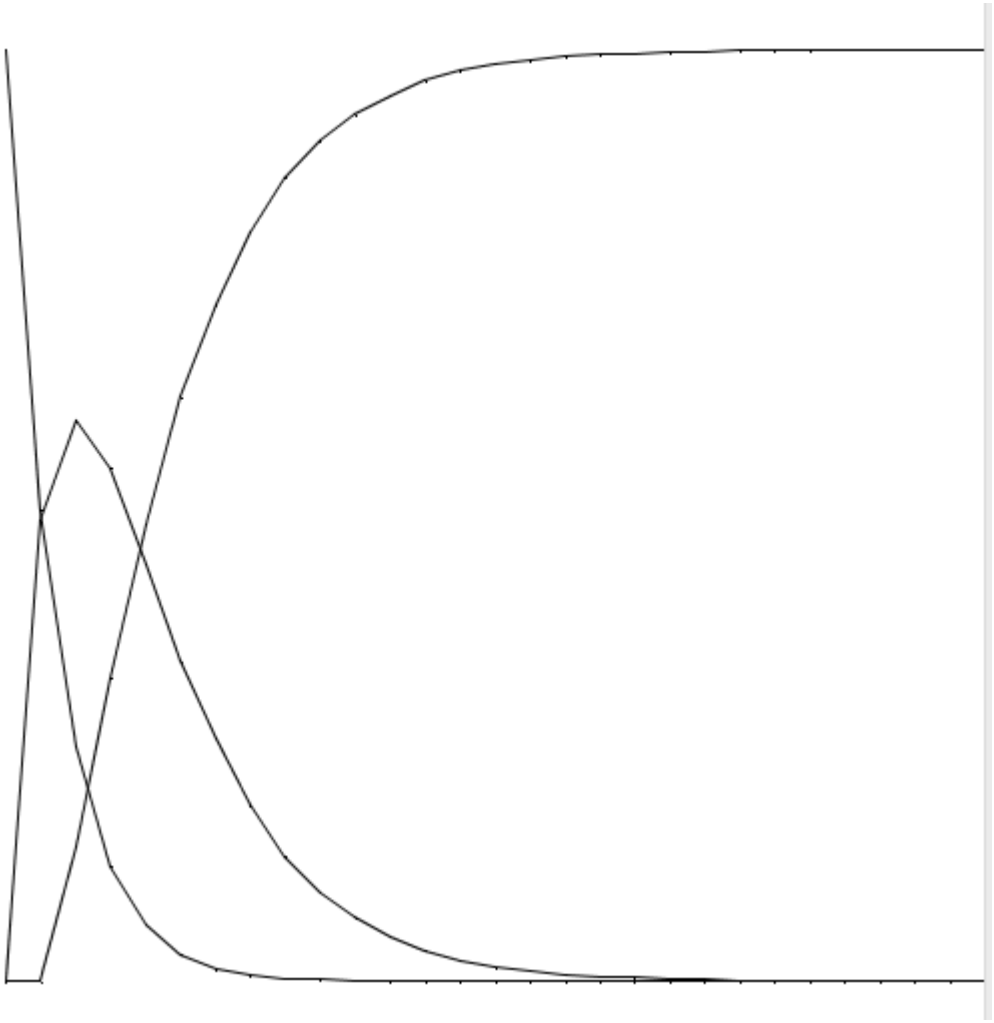
This equation describe the single photon. In this equation light is considered as a continuous electromagnetic wave. Therefore E is equal the energy of photon.

3 Lab

We use the program from our teacher to model the decay of atoms. In this case we should assume the amount of atoms and the rates of decay for different atoms in order to know the number of decay and how the rate of decay for both atom influence graph of decay. I assume that the amount of atoms is 10000 and the rate of decay from A to B is 0,5, And the rate of decay from B to C is 0.3.

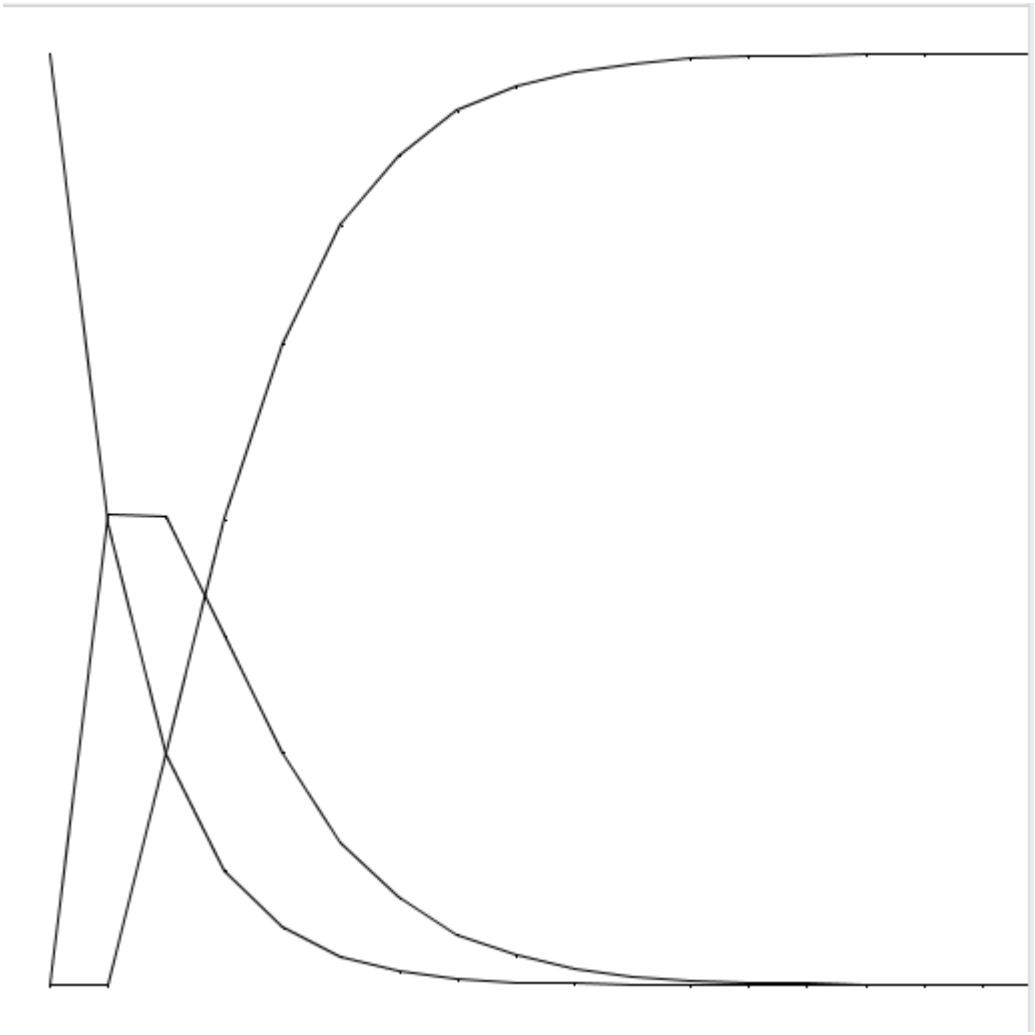
	A	B	C
1	10000	0	0
2	5057	4943	0
3	2529	6020	1451
4	1235	5511	3254
5	607	4484	4909
6	288	3441	6271
7	130	2608	7262
8	64	1892	8044
9	33	1342	8625
10	18	959	9023
11	5	692	9303
12	2	487	9511
13	1	336	9663
14	0	224	9776
15	0	151	9849
16	0	113	9887
17	0	71	9929
18	0	53	9947
19	0	38	9962
20	0	28	9972
21	0	18	9982
22	0	13	9987
23	0	11	9989
24	0	7	9993
25	0	3	9997
26	0	3	9997
27	0	2	9998
28	0	1	9999

The number of time steps was 28.



	A	B	C
1	10000	0	0
2	4944	5056	0
3	2469	5025	2506
4	1237	3757	5006
5	618	2501	6881
6	311	1530	8159
7	154	942	8904
8	65	550	9385
9	35	323	9642
10	16	182	9802
11	7	99	9894
12	2	54	9944
13	1	36	9963
14	1	16	9983
15	0	9	9991
16	0	5	9995
17	0	3	9997
18	0	1	9999
19	0	1	9999
20	0	1	9999

he number of time steps was 20.



The first table of data shows the 10000 atoms have 0.5 rate from A to B and 0.3 rate of decay from B to C. And the second table of data shows 10000 atoms have 0.5 decay rate from A to B and 0.5 decay rate from B to C. The first lab use 28 steps and the second lab use 20 steps. Because of higher decay rate from B to C, therefore the second slope of B is lower than first one. As we can see in second graph there is a flat peak. At that time the growth rate is same as the decay rate. But while A was became less and less, the growth rate of B cannot follow the decay rate of B.