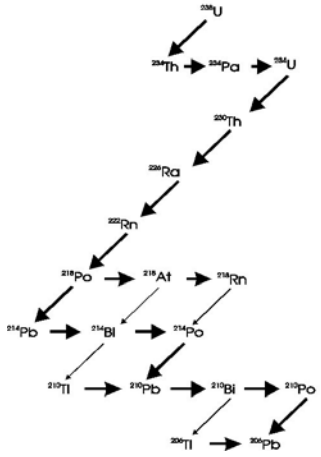
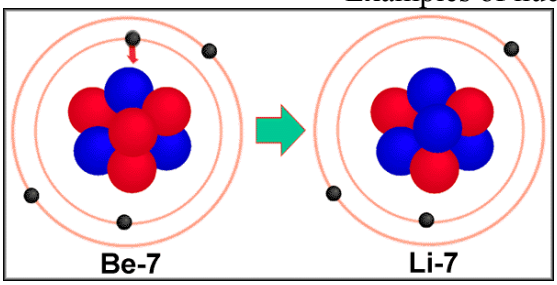


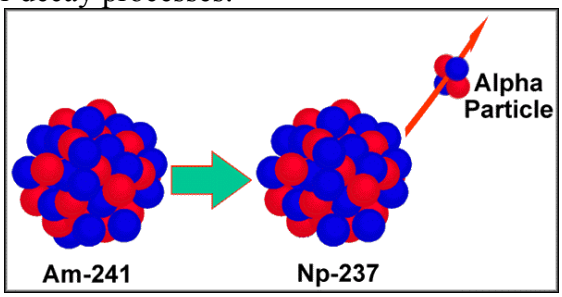
Nuclear decay.

Nuclear decay is a natural process that changes the chemical nature of an atom. For example, in an electron capture process, a beryllium atom changes into a lithium atom with the same mass, but with completely different chemical properties.

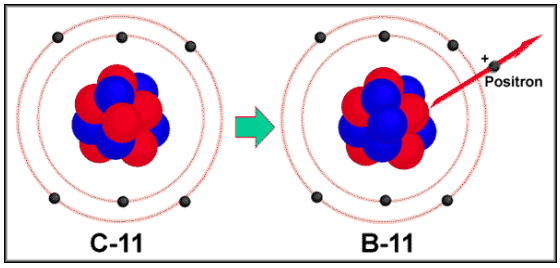
Examples of nuclear decay processes:



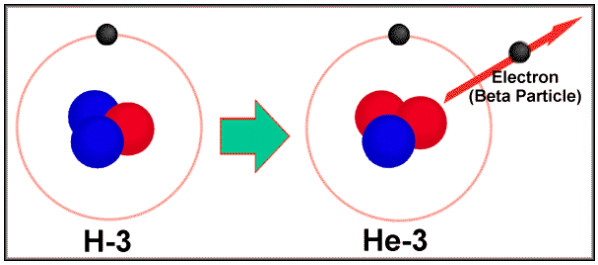
Electron capture



Helium emission



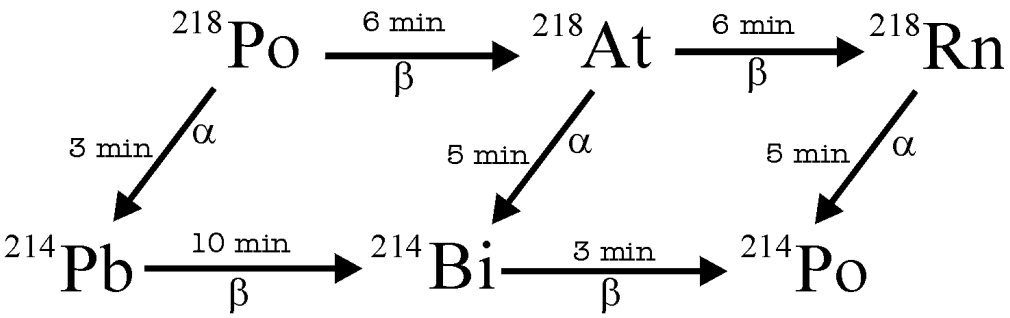
Positron emission



Electron emission

Write a program that calculates how much of which isotope is left after a specified amount of time. The program has to ask the user for the amount of isotopes under consideration and the decay paths with lifetimes. Hint: start with a simple program that only can simulate linear decay (every isotope decays into a single other isotope). Then try if you can manage to also write a program to simulate more complicated decay schemes, as shown above.

As an example, lets take a subset of the decay scheme above (the lifetimes given are fictitious):



The program then asks for the amount of time to simulate. In an example:

Number of isotopes
6
Isotope 1
Nome: *218Po*
Decay to isotope number (0=end): *2*
Lifetime of process (s): *360*
Decay to isotope number (0=end): *4*
Lifetime of process (s): *180*
Decay to isotope number (0=end): *0*
Isotope 2
Nome: *218At*
Decay to isotope number (0=end): *3*
Lifetime of process (s): *360*
Decay to isotope number (0=end): *5*
Lifetime of process (s): *300*
Decay to isotope number (0=end): *0*
Isotope 3
Nome: *218Rn*
Decay to isotope number (0=end): *6*
Lifetime of process (s): *300*
Decay to isotope number (0=end): *0*
Isotope 4
Nome: *214Pb*
Decay to isotope number (0=end): *5*
Lifetime of process (s): *600*
Decay to isotope number (0=end): *0*
Isotope 5
Nome: *214Bi*
Decay to isotope number (0=end): *6*
Lifetime of process (s): *180*
Decay to isotope number (0=end): *0*
Isotope 6
Nome: *214Po*
Decay to isotope number (0=end): *0*
Time to simulate: *100*

time	218Po	218At	218Rn	214Pb	214Bi	214Po
0.00	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.00	0.9917	0.0028	0.0000	0.0055	0.0000	0.0000
2.00	0.9834	0.0055	0.0000	0.0110	0.0000	0.0000
3.00	0.9753	0.0082	0.0000	0.0165	0.0001	0.0000
4.00	0.9672	0.0109	0.0000	0.0218	0.0001	0.0000
5.00	0.9591	0.0135	0.0001	0.0272	0.0002	0.0000
6.00	0.9511	0.0161	0.0001	0.0324	0.0003	0.0000
7.00	0.9432	0.0186	0.0002	0.0376	0.0004	0.0000
8.00	0.9354	0.0211	0.0002	0.0428	0.0005	0.0000
9.00	0.9276	0.0236	0.0003	0.0479	0.0006	0.0000
10.00	0.9199	0.0260	0.0003	0.0530	0.0008	0.0000
11.00	0.9123	0.0284	0.0004	0.0580	0.0010	0.0000
12.00	0.9047	0.0307	0.0005	0.0629	0.0011	0.0000
13.00	0.8971	0.0331	0.0006	0.0678	0.0013	0.0000
14.00	0.8897	0.0354	0.0007	0.0727	0.0016	0.0000
15.00	0.8823	0.0376	0.0007	0.0775	0.0018	0.0001
16.00	0.8750	0.0398	0.0008	0.0823	0.0020	0.0001
17.00	0.8677	0.0420	0.0010	0.0870	0.0023	0.0001
18.00	0.8605	0.0442	0.0011	0.0916	0.0026	0.0001
19.00	0.8533	0.0463	0.0012	0.0963	0.0029	0.0001
20.00	0.8462	0.0484	0.0013	0.1008	0.0032	0.0001
21.00	0.8392	0.0504	0.0014	0.1053	0.0035	0.0002
22.00	0.8322	0.0524	0.0016	0.1098	0.0038	0.0002
23.00	0.8253	0.0544	0.0017	0.1142	0.0041	0.0002
24.00	0.8184	0.0564	0.0019	0.1186	0.0045	0.0002
25.00	0.8116	0.0583	0.0020	0.1230	0.0048	0.0003
26.00	0.8049	0.0602	0.0022	0.1273	0.0052	0.0003
27.00	0.7982	0.0621	0.0023	0.1315	0.0056	0.0003
28.00	0.7915	0.0639	0.0025	0.1357	0.0060	0.0004
29.00	0.7850	0.0657	0.0027	0.1399	0.0064	0.0004
30.00	0.7784	0.0675	0.0028	0.1440	0.0068	0.0005
31.00	0.7720	0.0692	0.0030	0.1481	0.0072	0.0005
32.00	0.7655	0.0709	0.0032	0.1521	0.0077	0.0006
33.00	0.7592	0.0726	0.0034	0.1561	0.0081	0.0006
34.00	0.7529	0.0743	0.0036	0.1600	0.0086	0.0007
35.00	0.7466	0.0759	0.0038	0.1639	0.0090	0.0007
36.00	0.7404	0.0775	0.0040	0.1678	0.0095	0.0008
37.00	0.7342	0.0791	0.0042	0.1716	0.0100	0.0009
38.00	0.7281	0.0807	0.0044	0.1754	0.0105	0.0009

39.00	0.7221	0.0822	0.0046	0.1791	0.0110	0.0010
40.00	0.7161	0.0837	0.0048	0.1828	0.0115	0.0011
41.00	0.7101	0.0852	0.0050	0.1865	0.0120	0.0012
42.00	0.7042	0.0866	0.0052	0.1901	0.0126	0.0012
43.00	0.6984	0.0881	0.0055	0.1937	0.0131	0.0013
44.00	0.6926	0.0895	0.0057	0.1973	0.0136	0.0014
45.00	0.6868	0.0908	0.0059	0.2008	0.0142	0.0015
46.00	0.6811	0.0922	0.0061	0.2042	0.0147	0.0016
47.00	0.6754	0.0935	0.0064	0.2077	0.0153	0.0017
48.00	0.6698	0.0948	0.0066	0.2111	0.0159	0.0018
49.00	0.6643	0.0961	0.0069	0.2144	0.0165	0.0019
50.00	0.6587	0.0973	0.0071	0.2177	0.0170	0.0020
51.00	0.6533	0.0986	0.0073	0.2210	0.0176	0.0022
52.00	0.6478	0.0998	0.0076	0.2243	0.0182	0.0023
53.00	0.6424	0.1010	0.0078	0.2275	0.0188	0.0024
54.00	0.6371	0.1021	0.0081	0.2307	0.0194	0.0025
55.00	0.6318	0.1033	0.0084	0.2338	0.0201	0.0027
56.00	0.6265	0.1044	0.0086	0.2369	0.0207	0.0028
57.00	0.6213	0.1055	0.0089	0.2400	0.0213	0.0030
58.00	0.6162	0.1066	0.0091	0.2431	0.0219	0.0031
59.00	0.6110	0.1077	0.0094	0.2461	0.0226	0.0033
60.00	0.6060	0.1087	0.0097	0.2490	0.0232	0.0034
61.00	0.6009	0.1097	0.0099	0.2520	0.0239	0.0036
62.00	0.5959	0.1107	0.0102	0.2549	0.0245	0.0037
63.00	0.5910	0.1117	0.0105	0.2578	0.0252	0.0039
64.00	0.5861	0.1126	0.0108	0.2606	0.0258	0.0041
65.00	0.5812	0.1136	0.0110	0.2634	0.0265	0.0043
66.00	0.5764	0.1145	0.0113	0.2662	0.0272	0.0044
67.00	0.5716	0.1154	0.0116	0.2690	0.0279	0.0046
68.00	0.5668	0.1163	0.0119	0.2717	0.0285	0.0048
69.00	0.5621	0.1171	0.0122	0.2744	0.0292	0.0050
70.00	0.5574	0.1180	0.0124	0.2770	0.0299	0.0052
71.00	0.5528	0.1188	0.0127	0.2796	0.0306	0.0054
72.00	0.5482	0.1196	0.0130	0.2822	0.0313	0.0056
73.00	0.5436	0.1204	0.0133	0.2848	0.0320	0.0059
74.00	0.5391	0.1212	0.0136	0.2873	0.0327	0.0061
75.00	0.5346	0.1219	0.0139	0.2899	0.0334	0.0063
76.00	0.5302	0.1227	0.0142	0.2923	0.0341	0.0065
77.00	0.5258	0.1234	0.0145	0.2948	0.0348	0.0068
78.00	0.5214	0.1241	0.0148	0.2972	0.0355	0.0070
79.00	0.5171	0.1248	0.0151	0.2996	0.0362	0.0073
80.00	0.5128	0.1255	0.0154	0.3020	0.0369	0.0075
81.00	0.5085	0.1261	0.0157	0.3043	0.0376	0.0078
82.00	0.5043	0.1268	0.0160	0.3066	0.0383	0.0080
83.00	0.5001	0.1274	0.0163	0.3089	0.0391	0.0083
84.00	0.4959	0.1280	0.0165	0.3112	0.0398	0.0086
85.00	0.4918	0.1286	0.0168	0.3134	0.0405	0.0088
86.00	0.4877	0.1292	0.0172	0.3156	0.0412	0.0091
87.00	0.4837	0.1297	0.0175	0.3178	0.0420	0.0094
88.00	0.4797	0.1303	0.0178	0.3199	0.0427	0.0097
89.00	0.4757	0.1308	0.0181	0.3220	0.0434	0.0100
90.00	0.4717	0.1314	0.0184	0.3241	0.0442	0.0103
91.00	0.4678	0.1319	0.0187	0.3262	0.0449	0.0106
92.00	0.4639	0.1324	0.0190	0.3283	0.0456	0.0109
93.00	0.4600	0.1328	0.0193	0.3303	0.0464	0.0112
94.00	0.4562	0.1333	0.0196	0.3323	0.0471	0.0115
95.00	0.4524	0.1337	0.0199	0.3343	0.0478	0.0119
96.00	0.4487	0.1342	0.0202	0.3362	0.0486	0.0122
97.00	0.4449	0.1346	0.0205	0.3381	0.0493	0.0125
98.00	0.4412	0.1350	0.0208	0.3400	0.0500	0.0129
99.00	0.4376	0.1354	0.0211	0.3419	0.0508	0.0132
100.00	0.4339	0.1358	0.0214	0.3438	0.0515	0.0136