(21.8) Calculate the decontamination factor required for (a) fission product activity, and (b) for gadolinium in commercial plutonium nitrate produced from PWR fuel (Tables 21.2 and 21.7) at t_{cool} 10 y.

Data from Table 21.2.

$i := 1..30$

i	$Z_i :=$	$A_i :=$
1	6	0.04
2	34	0.025
3	37	0.00002
4	38	3900
5	39	3900
6	40	54
7	41	130
8	43	0.71
9	44	5900
10	45	5900
11	46	0.010
12	47	7.3
13	48	0.00002
14	49	4.10^{-13}
15	50	11
16	51	270
17	52	0.004
18	53	0.002
19	55	15000
20	56	6.10^{-8}
21	57	$1\cdot10^{-7}$
22	58	4000
23	59	4000
24	60	5.10^{-10}
25	61	2100
26	62	9.3
27	63	1600
28	64	0.32
29	65	0.36
30	66	2.10^{-13}

$$R_{tot} := \sum_{k=1}^{30} A_k \cdot 10^{12} \qquad R_{tot} = 4.678\cdot10^{16} \qquad m_{Pu} := 12$$

(a) $$DF_{FP} := \frac{R_{tot}}{1.5\cdot10^{9}\cdot m_{Pu}} \qquad DF_{FP} = 2.599\cdot10^{6}$$

$$C_{maxGd} := 4.4\cdot8\cdot10^{-6} \qquad C_{GD} := 0.52$$

(b) $$DF_{GD} := \frac{0.12}{C_{maxGd}\cdot m_{Pu}} \qquad DF_{GD} = 284.091$$