Electronic Supplementary Material (ESI) for Materials Advances.

Cite this: DOI: 00.0000/xxxxxxxxxx

Supplemental Material: Potential for Neutron and Proton Transmutation Doping of GaN and Ga_2O_3

1 Net Doping Character Temporal Variability

Using the attribution in the text and computed elemental concentrations in GaN and Ga_2O_3, the total *n*-type and *p*-type introduced dopants are presented in Fig. 1 - Fig. 4 as a function of time following irradiation.

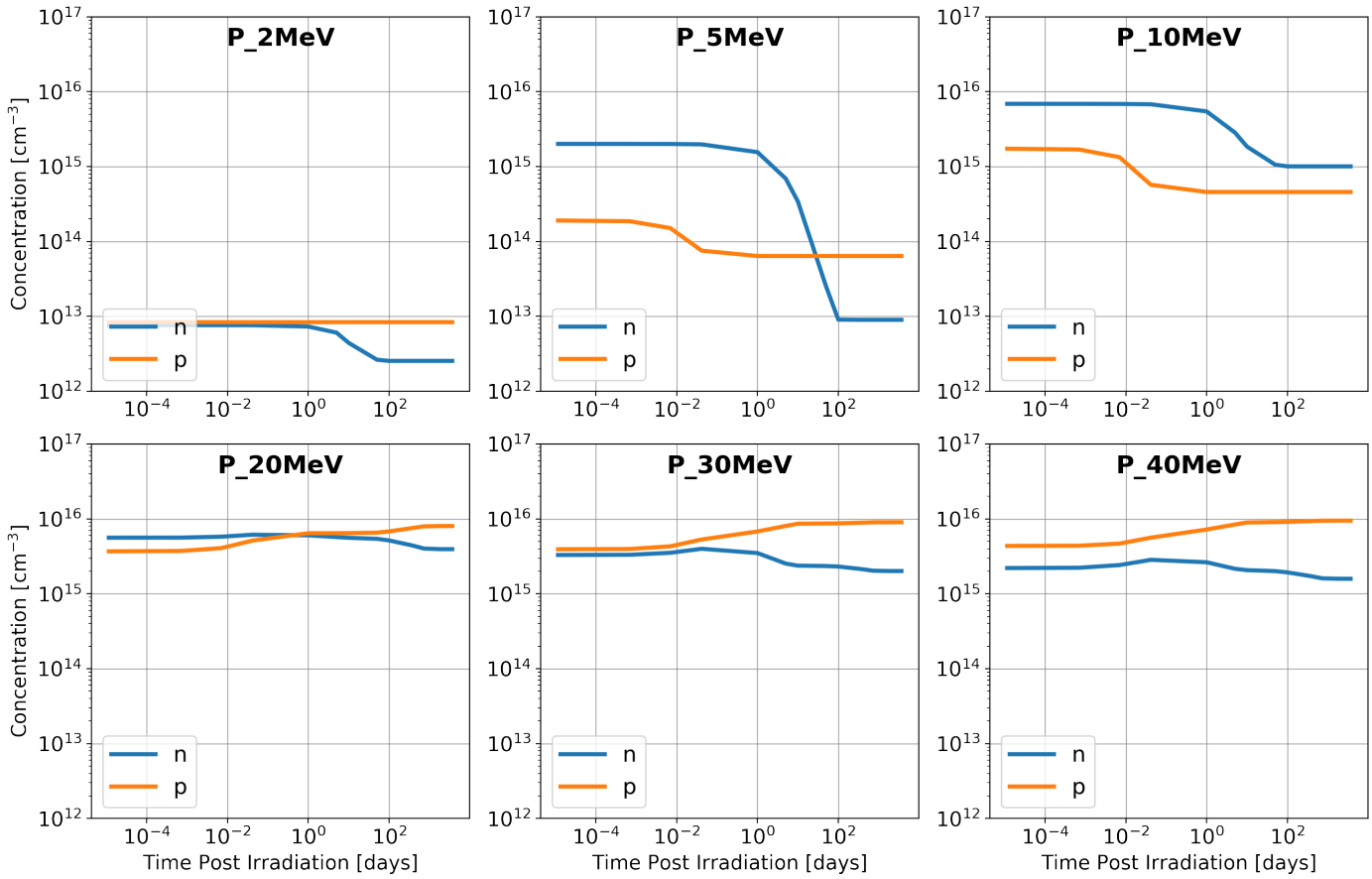

Fig. 1 Concentrations of introduced gross *n*-type and *p*-type elemental impurities in existence following quasi-monoenergetic 2, 5, 10, 20, 30, and 40 MeV proton irradiation of GaN. Attributions are made according to Table 2 in the text.

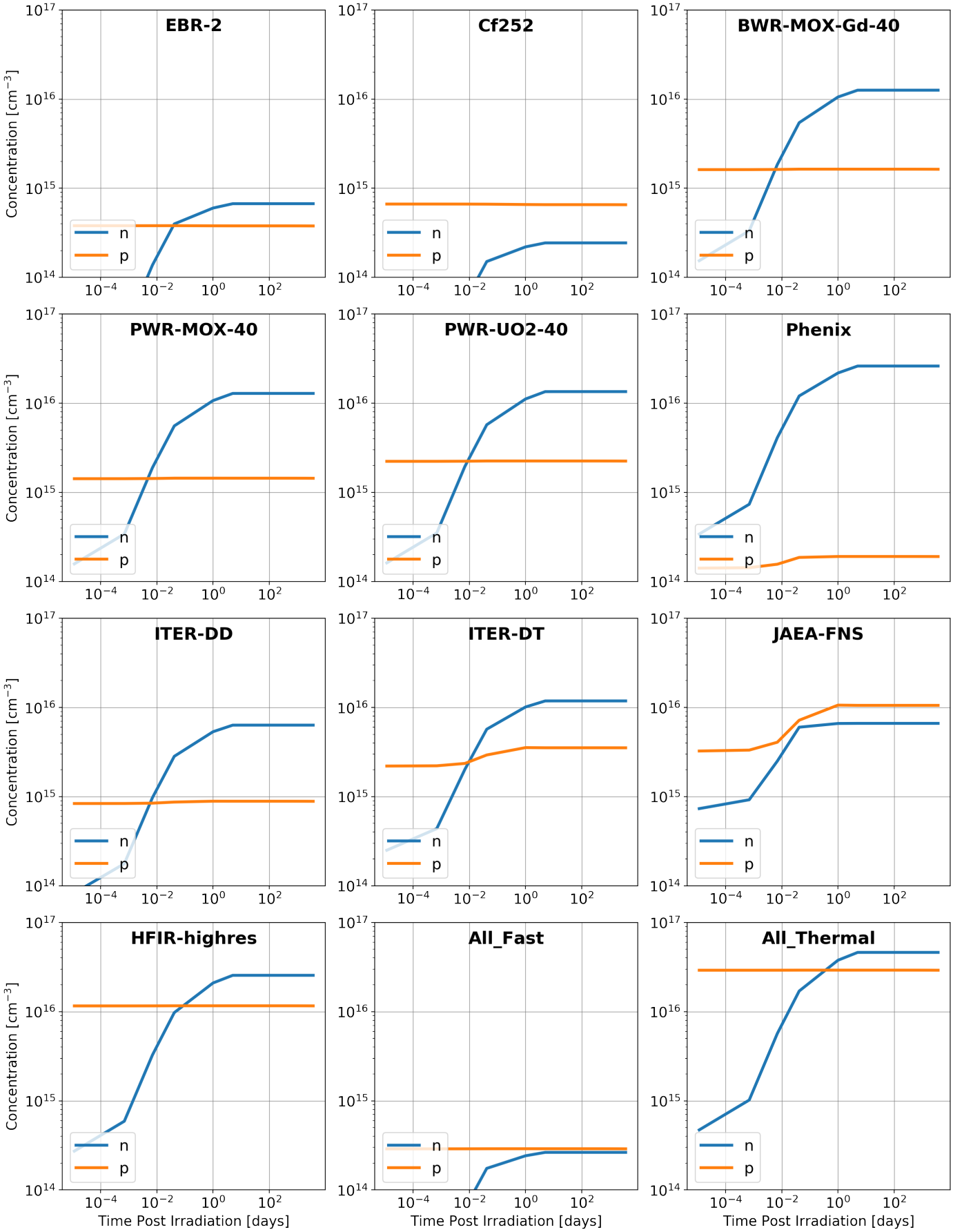

Fig. 2 Concentrations of introduced gross *n*-type and *p*-type elemental impurities in existence following neutron irradiation of GaN, the spectra of which are summarized in Fig. 1 in the text. Attributions are made according to Table 2 in the text.

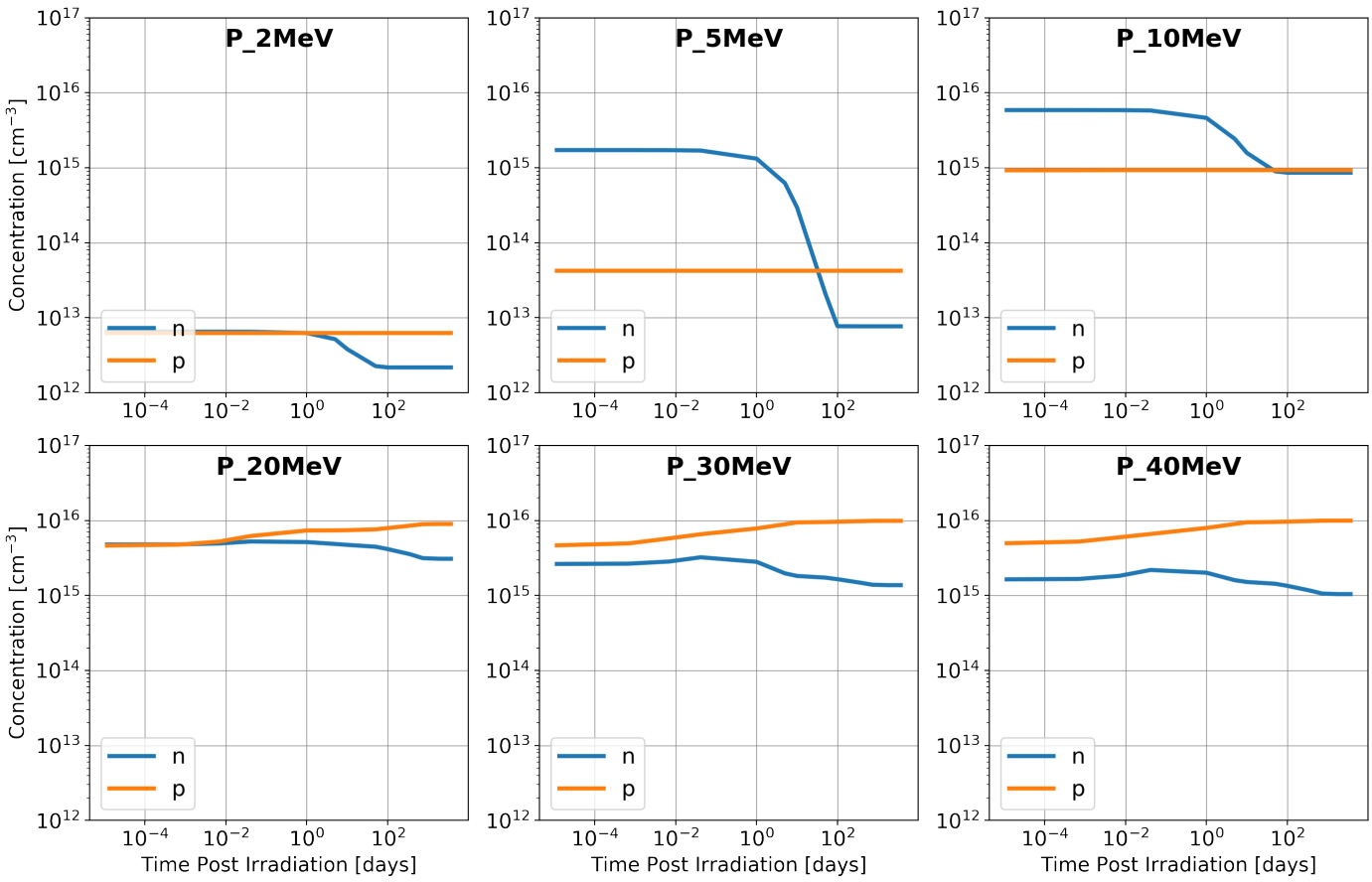

Fig. 3 Concentrations of introduced gross *n*-type and *p*-type elemental impurities in existence following quasi-monoenergetic 2, 5, 10, 20, 30, and 40 MeV proton irradiation of Ga_2O_3. Attributions are made according to Table 3 in the text.

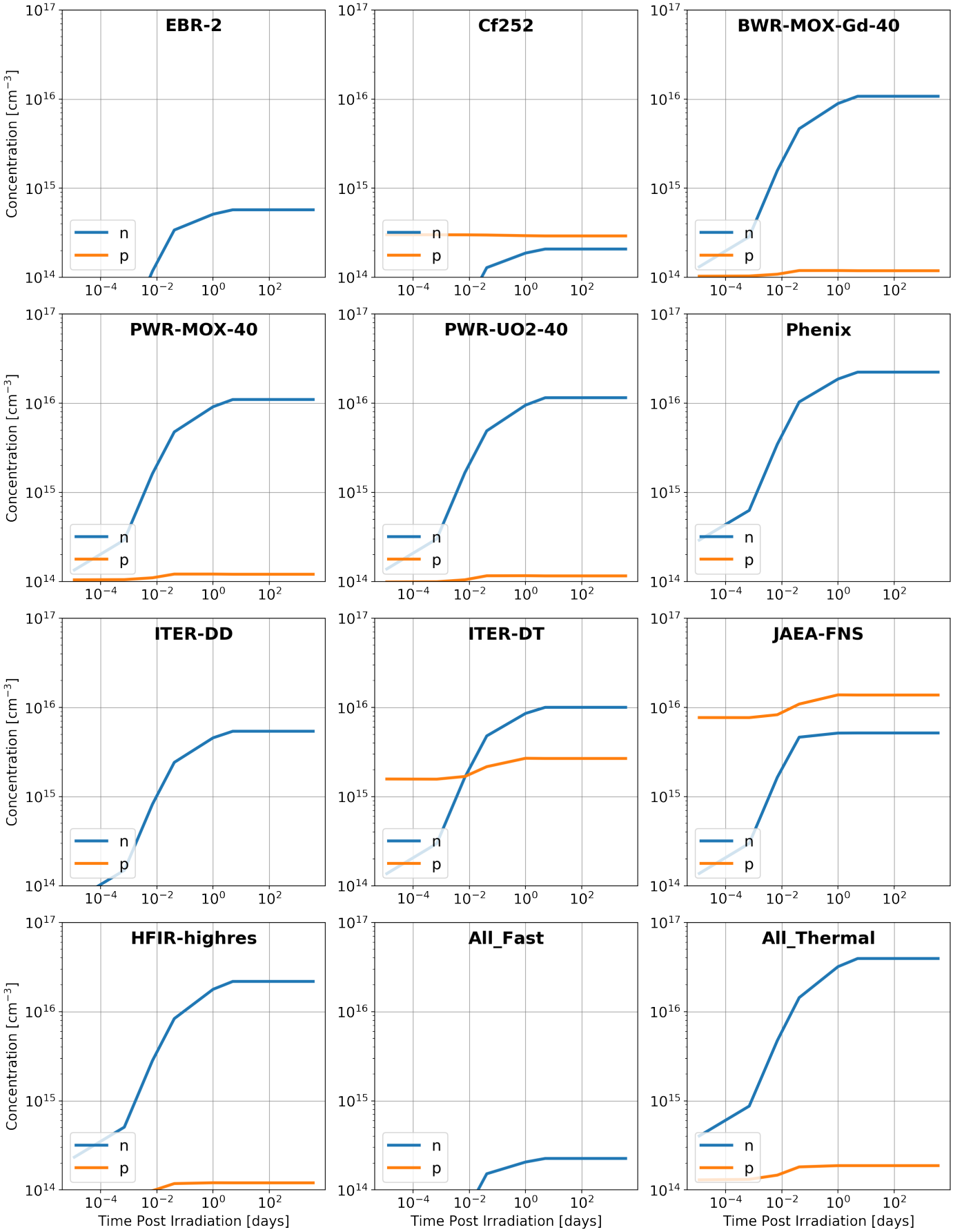

Fig. 4 Concentrations of introduced gross *n*-type and *p*-type elemental impurities in existence following neutron irradiation of Ga_2O_3, the spectra of which are summarized in Fig. 1 in the text. Attributions are made according to Table 3 in the text.

2 Net Sample Activity Temporal Variability

The total sample activity [Bq/cm^3] is presented in Fig. 5 - Fig. 8 for all proton and neutron spectra investigated in GaN and Ga_2O_3 as a function of time following 1 hour irradiation.

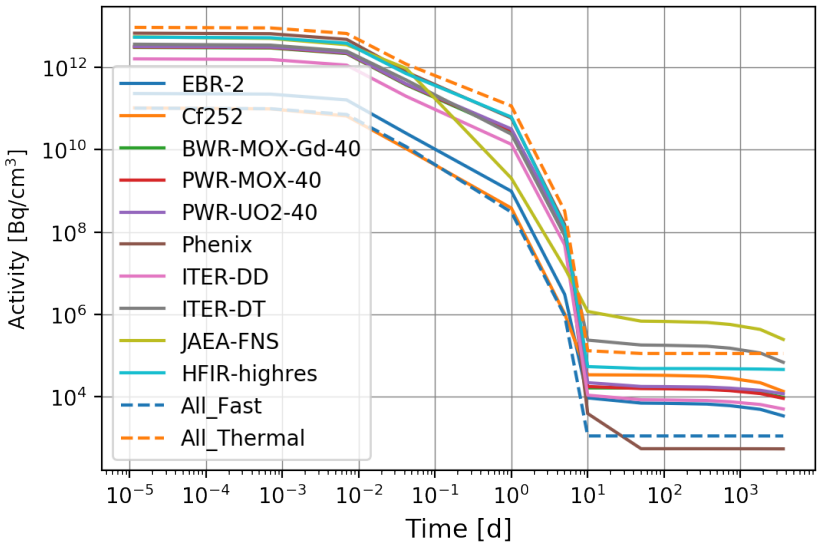

Fig. 5 Sample activity following neutron irradiation of GaN, the spectra of which are summarized in Fig. 1 in the text.

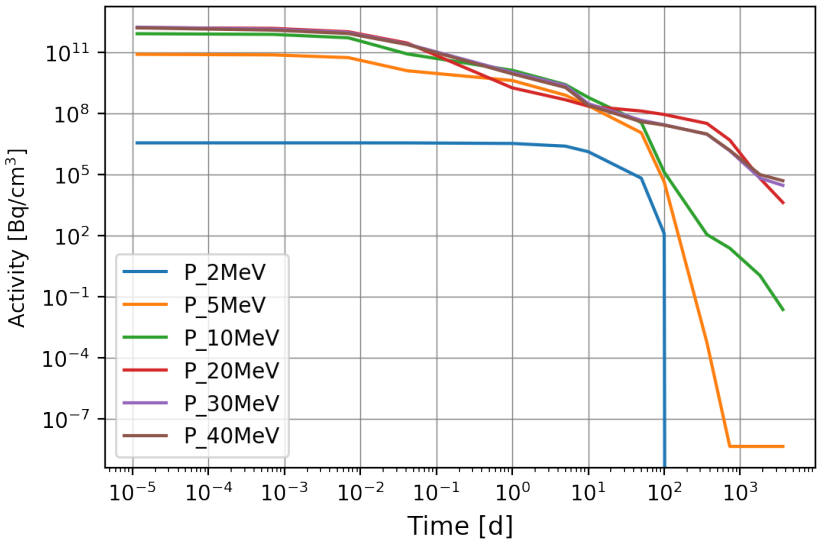

Fig. 6 Sample activity following quasi-monoenergetic 2, 5, 10, 20, 30, and 40 MeV proton irradiation of GaN.

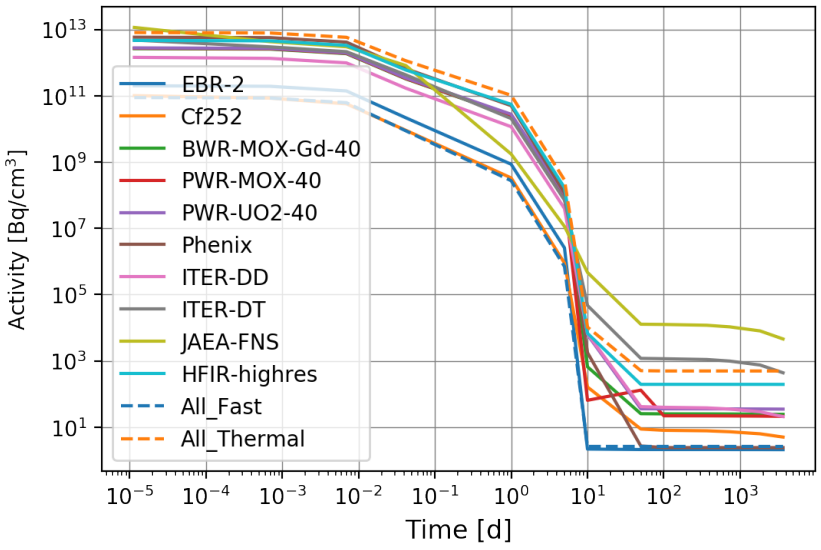

Fig. 7 Sample activity following neutron irradiation of Ga_2O_3, the spectra of which are summarized in Fig. 1 in the text.

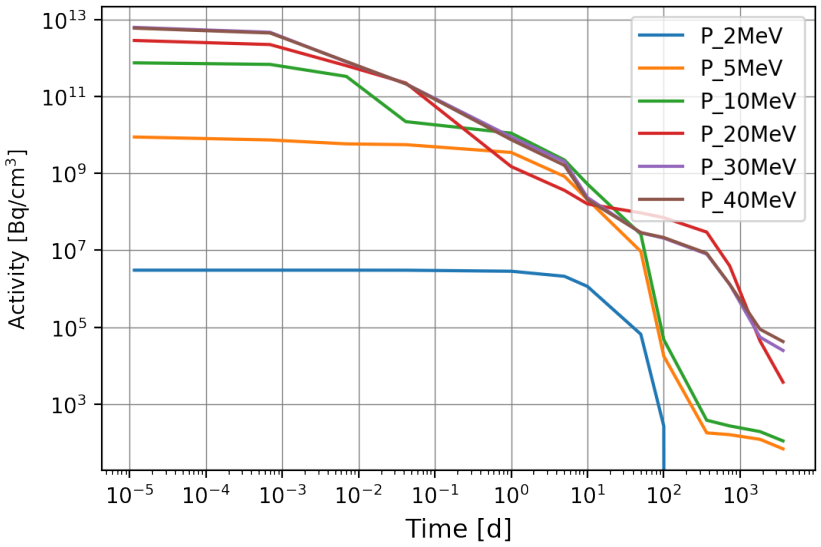

Fig. 8 Sample activity following quasi-monoenergetic 2, 5, 10, 20, 30, and 40 MeV proton irradiation of Ga_2O_3.

3 Impurity Concentration as a Function of Semiconductor, Irradiation Spectrum, and Time

All impurity concentrations following 1 hour irradiation of GaN and Ga_2O_3 are presented Table 1 - Table 6. These values are shown graphically in the text.

Table 1 Temporal elemental impurity concentrations [atoms/cm^3] in GaN produced from 1 hour of neutron irradiation. This table is extended in Table 2.

	Time [hr]	Element	EBR-2	252-Cf	BWR-MOX-Gd-40GWd	PWR-MOX-40GWd	PWR-UO2-40GWd	Phenix
0	2.78e-04	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
1	2.78e-04	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
2	2.78e-04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
3	2.78e-04	Cu	2.74e+08	1.53e+09	4.80e+08	4.94e+08	4.38e+08	3.04e+05
4	2.78e-04	Ga	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22
5	2.78e-04	Ge	3.20e+09	1.21e+09	4.27e+10	4.38e+10	4.50e+10	9.48e+10
6	2.78e-04	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
7	2.78e-04	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
8	2.78e-04	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
9	2.78e-04	N	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22
10	2.78e-04	Ni	0.00e+00	1.02e+03	2.79e+02	3.00e+02	2.31e+02	0.00e+00
11	2.78e-04	O	2.30e+05	2.73e+05	1.71e+05	1.67e+05	1.67e+05	3.63e+04
12	2.78e-04	Zn	9.34e+08	5.11e+09	1.77e+09	1.81e+09	1.65e+09	3.81e+08
13	1.67e-02	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
14	1.67e-02	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
15	1.67e-02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
16	1.67e-02	Cu	2.39e+08	1.33e+09	4.19e+08	4.32e+08	3.83e+08	2.67e+05
17	1.67e-02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
18	1.67e-02	Ge	6.92e+09	2.63e+09	9.24e+10	9.49e+10	9.74e+10	2.04e+11
19	1.67e-02	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
20	1.67e-02	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
21	1.67e-02	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
22	1.67e-02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
23	1.67e-02	Ni	0.00e+00	1.01e+03	2.78e+02	2.99e+02	2.30e+02	0.00e+00
24	1.67e-02	O	2.56e+05	3.04e+05	1.90e+05	1.85e+05	1.87e+05	4.00e+04
25	1.67e-02	Zn	9.77e+08	5.28e+09	2.01e+09	2.07e+09	1.90e+09	8.20e+08
26	1.67e-01	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
27	1.67e-01	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
28	1.67e-01	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
29	1.67e-01	Cu	6.51e+07	3.64e+08	1.17e+08	1.20e+08	1.01e+08	6.70e+04
30	1.67e-01	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
31	1.67e-01	Ge	3.81e+10	1.46e+10	5.12e+11	5.25e+11	5.43e+11	1.14e+12
32	1.67e-01	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
33	1.67e-01	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
34	1.67e-01	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
35	1.67e-01	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
36	1.67e-01	Ni	0.00e+00	9.67e+02	2.65e+02	2.86e+02	2.20e+02	0.00e+00
37	1.67e-01	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.03e+04
38	1.67e-01	Zn	1.22e+09	6.13e+09	3.91e+09	4.02e+09	3.88e+09	4.55e+09
39	1.00e+00	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
40	1.00e+00	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
41	1.00e+00	Cu	2.97e+05	3.03e+07	7.42e+06	7.91e+06	6.36e+06	5.67e+03
42	1.00e+00	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
43	1.00e+00	Ge	1.10e+11	4.17e+10	1.51e+12	1.55e+12	1.59e+12	3.35e+12
44	1.00e+00	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
45	1.00e+00	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
46	1.00e+00	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
47	1.00e+00	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
48	1.00e+00	Ni	0.00e+00	7.34e+02	2.02e+02	2.17e+02	1.67e+02	0.00e+00
49	1.00e+00	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
50	1.00e+00	Zn	1.36e+09	6.01e+09	7.53e+09	7.73e+09	7.68e+09	1.29e+10
51	2.40e+01	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
52	2.40e+01	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10

53	2.40e+01	Cu	2.79e+05	2.97e+07	7.35e+06	7.74e+06	6.30e+06	2.90e+03
54	2.40e+01	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
55	2.40e+01	Ge	1.67e+11	6.10e+10	2.93e+12	2.98e+12	3.10e+12	6.07e+12
56	2.40e+01	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
57	2.40e+01	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
58	2.40e+01	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
59	2.40e+01	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
60	2.40e+01	Ni	0.00e+00	2.92e+00	1.33e+00	1.41e+00	0.00e+00	0.00e+00
61	2.40e+01	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
62	2.40e+01	Zn	9.58e+08	4.32e+09	7.54e+09	7.76e+09	7.76e+09	1.42e+10
63	1.20e+02	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
64	1.20e+02	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
65	1.20e+02	Cu	2.79e+05	2.90e+07	7.19e+06	7.57e+06	6.17e+06	2.82e+03
66	1.20e+02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
67	1.20e+02	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.26e+12
68	1.20e+02	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
69	1.20e+02	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
70	1.20e+02	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
71	1.20e+02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
72	1.20e+02	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00
73	1.20e+02	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
74	1.20e+02	Zn	8.48e+08	3.75e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10
75	2.40e+02	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
76	2.40e+02	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
77	2.40e+02	Cu	2.79e+05	2.88e+07	7.14e+06	7.51e+06	6.12e+06	2.79e+03
78	2.40e+02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
79	2.40e+02	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.27e+12
80	2.40e+02	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
81	2.40e+02	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
82	2.40e+02	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
83	2.40e+02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
84	2.40e+02	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00
85	2.40e+02	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
86	2.40e+02	Zn	8.48e+08	3.74e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10
87	1.20e+03	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
88	1.20e+03	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
89	1.20e+03	Cu	2.79e+05	2.88e+07	7.13e+06	7.51e+06	6.12e+06	2.79e+03
90	1.20e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
91	1.20e+03	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.27e+12
92	1.20e+03	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
93	1.20e+03	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.55e+08
94	1.20e+03	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
95	1.20e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
96	1.20e+03	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00
97	1.20e+03	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
98	1.20e+03	Zn	8.48e+08	3.74e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10
99	2.40e+03	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
100	2.40e+03	C	1.04e+11	1.78e+11	4.47e+11	3.94e+11	6.18e+11	3.89e+10
101	2.40e+03	Cu	2.79e+05	2.88e+07	7.13e+06	7.51e+06	6.12e+06	2.79e+03
102	2.40e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
103	2.40e+03	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.27e+12
104	2.40e+03	H	1.05e+11	1.83e+11	4.49e+11	3.95e+11	6.19e+11	3.89e+10
105	2.40e+03	He	1.05e+11	4.13e+11	1.39e+11	1.40e+11	1.32e+11	2.55e+08
106	2.40e+03	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
107	2.40e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
108	2.40e+03	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00

109	2.40e+03	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
110	2.40e+03	Zn	8.48e+08	3.74e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10
111	8.76e+03	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
112	8.76e+03	C	1.04e+11	1.78e+11	4.47e+11	3.93e+11	6.18e+11	3.89e+10
113	8.76e+03	Cu	2.79e+05	2.88e+07	7.13e+06	7.51e+06	6.12e+06	2.79e+03
114	8.76e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
115	8.76e+03	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.27e+12
116	8.76e+03	H	1.05e+11	1.83e+11	4.48e+11	3.95e+11	6.19e+11	3.89e+10
117	8.76e+03	He	1.05e+11	4.14e+11	1.39e+11	1.40e+11	1.32e+11	2.55e+08
118	8.76e+03	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
119	8.76e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
120	8.76e+03	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00
121	8.76e+03	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
122	8.76e+03	Zn	8.48e+08	3.74e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10
123	1.75e+04	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
124	1.75e+04	C	1.04e+11	1.78e+11	4.47e+11	3.93e+11	6.18e+11	3.89e+10
125	1.75e+04	Cu	2.79e+05	2.88e+07	7.13e+06	7.51e+06	6.12e+06	2.79e+03
126	1.75e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
127	1.75e+04	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.27e+12
128	1.75e+04	H	1.05e+11	1.82e+11	4.48e+11	3.95e+11	6.19e+11	3.89e+10
129	1.75e+04	He	1.05e+11	4.14e+11	1.40e+11	1.41e+11	1.32e+11	2.55e+08
130	1.75e+04	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
131	1.75e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
132	1.75e+04	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00
133	1.75e+04	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
134	1.75e+04	Zn	8.48e+08	3.74e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10
135	4.38e+04	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
136	4.38e+04	C	1.04e+11	1.78e+11	4.47e+11	3.93e+11	6.17e+11	3.89e+10
137	4.38e+04	Cu	2.79e+05	2.88e+07	7.13e+06	7.51e+06	6.12e+06	2.79e+03
138	4.38e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
139	4.38e+04	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.27e+12
140	4.38e+04	H	1.05e+11	1.81e+11	4.48e+11	3.94e+11	6.19e+11	3.89e+10
141	4.38e+04	He	1.05e+11	4.15e+11	1.40e+11	1.41e+11	1.33e+11	2.55e+08
142	4.38e+04	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
143	4.38e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
144	4.38e+04	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00
145	4.38e+04	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
146	4.38e+04	Zn	8.48e+08	3.74e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10
147	8.76e+04	B	1.05e+11	4.11e+11	1.39e+11	1.40e+11	1.32e+11	2.54e+08
148	8.76e+04	C	1.04e+11	1.78e+11	4.46e+11	3.93e+11	6.16e+11	3.88e+10
149	8.76e+04	Cu	2.79e+05	2.88e+07	7.13e+06	7.51e+06	6.12e+06	2.79e+03
150	8.76e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
151	8.76e+04	Ge	1.86e+11	6.76e+10	3.50e+12	3.58e+12	3.75e+12	7.27e+12
152	8.76e+04	H	1.05e+11	1.80e+11	4.48e+11	3.94e+11	6.18e+11	3.89e+10
153	8.76e+04	He	1.06e+11	4.16e+11	1.40e+11	1.41e+11	1.33e+11	2.55e+08
154	8.76e+04	Li	8.37e+04	6.75e+07	1.62e+07	1.71e+07	1.38e+07	6.36e+03
155	8.76e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
156	8.76e+04	Ni	0.00e+00	3.90e+00	1.78e+00	1.92e+00	0.00e+00	0.00e+00
157	8.76e+04	O	2.57e+05	3.04e+05	1.91e+05	1.86e+05	1.87e+05	4.04e+04
158	8.76e+04	Zn	8.48e+08	3.74e+09	7.36e+09	7.56e+09	7.58e+09	1.42e+10

Table 2 Temporal elemental impurity concentrations [atoms/cm^3] in GaN produced from 1 hour of neutron irradiation. This table is an extension of Table 1.

	Time [hr]	Element	ITER-DD	ITER-DT	JAEA-FNS	HFIR-highres	All_Fast	All_Thermal

0	2.78e-04	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
1	2.78e-04	C	2.29e+11	5.12e+11	4.36e+11	3.22e+12	8.03e+10	8.10e+12
2	2.78e-04	Co	0.00e+00	0.00e+00	3.80e+01	0.00e+00	0.00e+00	0.00e+00
3	2.78e-04	Cu	6.19e+08	2.03e+10	9.99e+10	1.79e+08	2.48e+04	2.21e+03
4	2.78e-04	Ga	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22
5	2.78e-04	Ge	2.23e+10	4.45e+10	4.46e+10	7.57e+10	1.43e+09	1.31e+11
6	2.78e-04	H	2.31e+11	5.85e+11	7.73e+11	3.22e+12	8.03e+10	8.10e+12
7	2.78e-04	He	1.55e+11	2.14e+11	7.94e+11	6.04e+10	1.51e+10	2.47e+03
8	2.78e-04	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
9	2.78e-04	N	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22
10	2.78e-04	Ni	3.57e+02	2.11e+04	5.24e+05	0.00e+00	0.00e+00	0.00e+00
11	2.78e-04	O	2.15e+05	1.57e+05	1.34e+05	2.10e+05	2.93e+05	3.49e+05
12	2.78e-04	Zn	2.67e+09	7.89e+10	3.66e+11	9.12e+08	5.90e+06	5.16e+08
13	1.67e-02	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
14	1.67e-02	C	2.29e+11	5.13e+11	4.38e+11	3.22e+12	8.03e+10	8.10e+12
15	1.67e-02	Co	0.00e+00	0.00e+00	3.23e+01	0.00e+00	0.00e+00	0.00e+00
16	1.67e-02	Cu	5.54e+08	1.82e+10	9.13e+10	1.57e+08	2.18e+04	1.94e+03
17	1.67e-02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
18	1.67e-02	Ge	4.84e+10	9.65e+10	9.69e+10	1.64e+11	3.08e+09	2.83e+11
19	1.67e-02	H	2.31e+11	5.85e+11	7.73e+11	3.22e+12	8.03e+10	8.10e+12
20	1.67e-02	He	1.55e+11	2.14e+11	7.94e+11	6.04e+10	1.51e+10	2.47e+03
21	1.67e-02	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
22	1.67e-02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
23	1.67e-02	Ni	3.55e+02	2.10e+04	5.21e+05	0.00e+00	0.00e+00	0.00e+00
24	1.67e-02	O	2.41e+05	1.74e+05	1.49e+05	2.33e+05	3.27e+05	3.88e+05
25	1.67e-02	Zn	2.94e+09	8.46e+10	3.93e+11	1.28e+09	1.27e+07	1.11e+09
26	1.67e-01	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
27	1.67e-01	C	2.29e+11	5.15e+11	4.51e+11	3.22e+12	8.03e+10	8.10e+12
28	1.67e-01	Co	0.00e+00	0.00e+00	1.50e+01	0.00e+00	0.00e+00	0.00e+00
29	1.67e-01	Cu	2.92e+08	9.78e+09	5.91e+10	4.45e+07	5.27e+03	4.81e+02
30	1.67e-01	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
31	1.67e-01	Ge	2.69e+11	5.36e+11	5.36e+11	9.05e+11	1.72e+10	1.58e+12
32	1.67e-01	H	2.31e+11	5.85e+11	7.73e+11	3.22e+12	8.03e+10	8.10e+12
33	1.67e-01	He	1.55e+11	2.14e+11	7.94e+11	6.04e+10	1.51e+10	2.47e+03
34	1.67e-01	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
35	1.67e-01	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
36	1.67e-01	Ni	3.39e+02	2.01e+04	4.98e+05	0.00e+00	0.00e+00	0.00e+00
37	1.67e-01	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
38	1.67e-01	Zn	5.13e+09	1.29e+11	6.20e+11	4.27e+09	7.00e+07	6.17e+09
39	1.00e+00	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
40	1.00e+00	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.03e+10	8.10e+12
41	1.00e+00	Cu	2.08e+08	7.04e+09	4.87e+10	2.18e+06	1.20e+03	4.10e+01
42	1.00e+00	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
43	1.00e+00	Ge	7.86e+11	1.56e+12	1.51e+12	2.71e+12	4.85e+10	4.73e+12
44	1.00e+00	H	2.31e+11	5.85e+11	7.73e+11	3.22e+12	8.03e+10	8.10e+12
45	1.00e+00	He	1.55e+11	2.14e+11	7.94e+11	6.04e+10	1.51e+10	2.47e+03
46	1.00e+00	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
47	1.00e+00	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
48	1.00e+00	Ni	2.58e+02	1.52e+04	3.78e+05	0.00e+00	0.00e+00	0.00e+00
49	1.00e+00	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
50	1.00e+00	Zn	1.18e+10	2.90e+11	1.48e+12	1.08e+10	1.95e+08	1.75e+10
51	2.40e+01	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
52	2.40e+01	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.03e+10	8.10e+12
53	2.40e+01	Cu	2.06e+08	6.95e+09	4.79e+10	2.14e+06	0.00e+00	0.00e+00
54	2.40e+01	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22

55	2.40e+01	Ge	1.48e+12	2.79e+12	1.68e+12	5.83e+12	6.71e+10	1.05e+13
56	2.40e+01	H	2.31e+11	5.85e+11	7.73e+11	3.22e+12	8.03e+10	8.10e+12
57	2.40e+01	He	1.55e+11	2.14e+11	7.94e+11	6.04e+10	1.51e+10	2.47e+03
58	2.40e+01	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
59	2.40e+01	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
60	2.40e+01	Ni	0.00e+00	2.01e+01	5.79e+02	0.00e+00	0.00e+00	0.00e+00
61	2.40e+01	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
62	2.40e+01	Zn	1.72e+10	4.60e+11	2.44e+12	1.16e+10	2.18e+08	1.93e+10
63	1.20e+02	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
64	1.20e+02	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.03e+10	8.10e+12
65	1.20e+02	Cu	2.00e+08	6.75e+09	4.59e+10	2.12e+06	0.00e+00	0.00e+00
66	1.20e+02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
67	1.20e+02	Ge	1.76e+12	3.26e+12	1.68e+12	7.09e+12	7.33e+10	1.28e+13
68	1.20e+02	H	2.31e+11	5.85e+11	7.73e+11	3.22e+12	8.03e+10	8.10e+12
69	1.20e+02	He	1.55e+11	2.14e+11	7.94e+11	6.04e+10	1.51e+10	2.47e+03
70	1.20e+02	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
71	1.20e+02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
72	1.20e+02	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
73	1.20e+02	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
74	1.20e+02	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10
75	2.40e+02	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
76	2.40e+02	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.03e+10	8.10e+12
77	2.40e+02	Cu	1.99e+08	6.69e+09	4.53e+10	2.11e+06	0.00e+00	0.00e+00
78	2.40e+02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
79	2.40e+02	Ge	1.76e+12	3.26e+12	1.68e+12	7.10e+12	7.33e+10	1.28e+13
80	2.40e+02	H	2.31e+11	5.85e+11	7.73e+11	3.22e+12	8.03e+10	8.10e+12
81	2.40e+02	He	1.55e+11	2.14e+11	7.94e+11	6.04e+10	1.51e+10	2.47e+03
82	2.40e+02	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
83	2.40e+02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
84	2.40e+02	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
85	2.40e+02	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
86	2.40e+02	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10
87	1.20e+03	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
88	1.20e+03	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.03e+10	8.10e+12
89	1.20e+03	Cu	1.99e+08	6.68e+09	4.53e+10	2.11e+06	0.00e+00	0.00e+00
90	1.20e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
91	1.20e+03	Ge	1.76e+12	3.26e+12	1.68e+12	7.10e+12	7.33e+10	1.28e+13
92	1.20e+03	H	2.31e+11	5.85e+11	7.72e+11	3.22e+12	8.03e+10	8.10e+12
93	1.20e+03	He	1.55e+11	2.14e+11	7.95e+11	6.04e+10	1.51e+10	2.47e+03
94	1.20e+03	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
95	1.20e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
96	1.20e+03	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
97	1.20e+03	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
98	1.20e+03	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10
99	2.40e+03	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
100	2.40e+03	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.03e+10	8.09e+12
101	2.40e+03	Cu	1.99e+08	6.68e+09	4.53e+10	2.11e+06	0.00e+00	0.00e+00
102	2.40e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
103	2.40e+03	Ge	1.76e+12	3.26e+12	1.68e+12	7.10e+12	7.33e+10	1.28e+13
104	2.40e+03	H	2.31e+11	5.85e+11	7.71e+11	3.22e+12	8.03e+10	8.10e+12
105	2.40e+03	He	1.55e+11	2.15e+11	7.96e+11	6.04e+10	1.51e+10	2.47e+03
106	2.40e+03	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
107	2.40e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
108	2.40e+03	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
109	2.40e+03	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
110	2.40e+03	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10

111	8.76e+03	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
112	8.76e+03	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.02e+10	8.09e+12
113	8.76e+03	Cu	1.99e+08	6.68e+09	4.53e+10	2.11e+06	0.00e+00	0.00e+00
114	8.76e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
115	8.76e+03	Ge	1.76e+12	3.26e+12	1.68e+12	7.10e+12	7.33e+10	1.28e+13
116	8.76e+03	H	2.31e+11	5.83e+11	7.65e+11	3.22e+12	8.03e+10	8.10e+12
117	8.76e+03	He	1.55e+11	2.16e+11	8.02e+11	6.04e+10	1.51e+10	2.47e+03
118	8.76e+03	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
119	8.76e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
120	8.76e+03	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
121	8.76e+03	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
122	8.76e+03	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10
123	1.75e+04	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
124	1.75e+04	C	2.29e+11	5.17e+11	4.65e+11	3.22e+12	8.02e+10	8.09e+12
125	1.75e+04	Cu	1.99e+08	6.68e+09	4.53e+10	2.11e+06	0.00e+00	0.00e+00
126	1.75e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
127	1.75e+04	Ge	1.76e+12	3.26e+12	1.68e+12	7.10e+12	7.33e+10	1.28e+13
128	1.75e+04	H	2.31e+11	5.80e+11	7.54e+11	3.22e+12	8.03e+10	8.10e+12
129	1.75e+04	He	1.55e+11	2.19e+11	8.13e+11	6.05e+10	1.51e+10	2.47e+03
130	1.75e+04	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
131	1.75e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
132	1.75e+04	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
133	1.75e+04	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
134	1.75e+04	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10
135	4.38e+04	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
136	4.38e+04	C	2.29e+11	5.16e+11	4.65e+11	3.22e+12	8.02e+10	8.09e+12
137	4.38e+04	Cu	1.99e+08	6.68e+09	4.53e+10	2.11e+06	0.00e+00	0.00e+00
138	4.38e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
139	4.38e+04	Ge	1.76e+12	3.26e+12	1.68e+12	7.10e+12	7.33e+10	1.28e+13
140	4.38e+04	H	2.31e+11	5.75e+11	7.33e+11	3.22e+12	8.03e+10	8.10e+12
141	4.38e+04	He	1.55e+11	2.24e+11	8.34e+11	6.06e+10	1.51e+10	2.47e+03
142	4.38e+04	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
143	4.38e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
144	4.38e+04	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
145	4.38e+04	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
146	4.38e+04	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10
147	8.76e+04	B	1.53e+11	1.41e+11	3.64e+11	6.02e+10	1.51e+10	0.00e+00
148	8.76e+04	C	2.29e+11	5.16e+11	4.65e+11	3.21e+12	8.01e+10	8.08e+12
149	8.76e+04	Cu	1.99e+08	6.68e+09	4.53e+10	2.11e+06	0.00e+00	0.00e+00
150	8.76e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
151	8.76e+04	Ge	1.76e+12	3.26e+12	1.68e+12	7.10e+12	7.33e+10	1.28e+13
152	8.76e+04	H	2.31e+11	5.68e+11	7.04e+11	3.22e+12	8.03e+10	8.10e+12
153	8.76e+04	He	1.55e+11	2.32e+11	8.63e+11	6.08e+10	1.51e+10	2.47e+03
154	8.76e+04	Li	7.54e+08	2.50e+10	1.59e+11	5.20e+06	0.00e+00	0.00e+00
155	8.76e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
156	8.76e+04	Ni	0.00e+00	0.00e+00	4.77e+01	0.00e+00	0.00e+00	0.00e+00
157	8.76e+04	O	2.40e+05	1.75e+05	1.49e+05	2.34e+05	3.29e+05	3.91e+05
158	8.76e+04	Zn	1.71e+10	4.56e+11	2.42e+12	1.15e+10	2.18e+08	1.93e+10

Table 3 Temporal elemental impurity concentrations [atoms/cm^3] in GaN produced from 1 hour of proton irradiation.

	Time [hr]	Element	2MeV	5MeV	10MeV	20MeV	30MeV	40MeV
0	2.78e-04	As	0.00e+00	3.10e+00	4.38e+01	8.87e+00	0.00e+00	0.00e+00
1	2.78e-04	B	0.00e+00	1.61e+09	1.63e+10	1.87e+11	2.51e+11	1.72e+11
2	2.78e-04	Be	0.00e+00	1.34e+03	1.90e+03	1.46e+11	9.44e+10	5.50e+10

3	2.78e-04	C	3.45e+09	6.65e+10	6.63e+11	1.15e+12	1.08e+12	8.91e+11
4	2.78e-04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.77e+05	3.66e+07
5	2.78e-04	Cu	0.00e+00	0.00e+00	2.43e+05	5.27e+09	3.20e+10	9.78e+10
6	2.78e-04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.70e+05
7	2.78e-04	Ga	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22
8	2.78e-04	Ge	3.39e+09	8.91e+11	3.05e+12	2.49e+12	1.37e+12	8.54e+11
9	2.78e-04	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
10	2.78e-04	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
11	2.78e-04	Li	0.00e+00	2.45e+01	3.48e+01	7.68e+08	9.22e+10	1.25e+11
12	2.78e-04	N	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22	8.85e+22
13	2.78e-04	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	3.24e+09	9.73e+09
14	2.78e-04	O	1.88e+04	3.22e+04	3.68e+09	6.17e+09	3.62e+09	2.72e+09
15	2.78e-04	Zn	2.78e+08	1.81e+10	1.06e+11	3.41e+11	5.39e+11	8.86e+11
16	1.67e-02	As	0.00e+00	3.10e+00	4.31e+01	7.59e+00	0.00e+00	0.00e+00
17	1.67e-02	B	0.00e+00	3.47e+09	3.53e+10	1.93e+11	2.56e+11	1.76e+11
18	1.67e-02	Be	0.00e+00	1.34e+03	1.90e+03	1.46e+11	9.44e+10	5.50e+10
19	1.67e-02	C	3.45e+09	6.46e+10	6.44e+11	1.15e+12	1.09e+12	8.94e+11
20	1.67e-02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.70e+05	3.62e+07
21	1.67e-02	Cu	0.00e+00	0.00e+00	2.43e+05	5.27e+09	3.19e+10	9.72e+10
22	1.67e-02	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.70e+05
23	1.67e-02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
24	1.67e-02	Ge	3.39e+09	8.91e+11	3.05e+12	2.50e+12	1.38e+12	8.65e+11
25	1.67e-02	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
26	1.67e-02	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
27	1.67e-02	Li	0.00e+00	2.45e+01	3.48e+01	7.69e+08	9.22e+10	1.25e+11
28	1.67e-02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
29	1.67e-02	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	3.24e+09	9.76e+09
30	1.67e-02	O	1.88e+04	2.73e+04	2.17e+09	3.46e+09	2.01e+09	1.53e+09
31	1.67e-02	Zn	2.78e+08	1.81e+10	1.06e+11	3.53e+11	5.49e+11	8.96e+11
32	1.67e-01	As	0.00e+00	3.09e+00	3.76e+01	5.76e+00	0.00e+00	0.00e+00
33	1.67e-01	B	0.00e+00	1.92e+10	1.94e+11	2.43e+11	2.64e+11	1.80e+11
34	1.67e-01	Be	0.00e+00	1.34e+03	1.90e+03	1.46e+11	9.44e+10	5.50e+10
35	1.67e-01	C	3.45e+09	4.89e+10	4.87e+11	1.19e+12	1.14e+12	9.36e+11
36	1.67e-01	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.04e+05	3.43e+07
37	1.67e-01	Cu	0.00e+00	0.00e+00	2.43e+05	5.28e+09	3.11e+10	9.44e+10
38	1.67e-01	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.70e+05
39	1.67e-01	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
40	1.67e-01	Ge	3.38e+09	8.89e+11	3.05e+12	2.57e+12	1.48e+12	9.51e+11
41	1.67e-01	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
42	1.67e-01	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
43	1.67e-01	Li	0.00e+00	2.46e+01	3.49e+01	7.82e+08	9.22e+10	1.25e+11
44	1.67e-01	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
45	1.67e-01	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	3.32e+09	1.00e+10
46	1.67e-01	O	1.88e+04	2.73e+04	2.99e+07	2.01e+07	9.27e+06	7.68e+06
47	1.67e-01	Zn	2.78e+08	1.81e+10	1.06e+11	4.71e+11	6.44e+11	9.87e+11
48	1.00e+00	As	0.00e+00	3.06e+00	2.54e+01	1.56e+00	0.00e+00	0.00e+00
49	1.00e+00	B	0.00e+00	5.28e+10	5.35e+11	3.50e+11	2.83e+11	1.87e+11
50	1.00e+00	Be	0.00e+00	1.34e+03	1.90e+03	1.46e+11	9.44e+10	5.50e+10
51	1.00e+00	C	3.45e+09	1.53e+10	1.47e+11	1.16e+12	1.19e+12	9.74e+11
52	1.00e+00	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.94e+05	2.53e+07
53	1.00e+00	Cu	0.00e+00	0.00e+00	2.44e+05	5.30e+09	3.01e+10	9.55e+10
54	1.00e+00	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.70e+05
55	1.00e+00	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
56	1.00e+00	Ge	3.38e+09	8.80e+11	3.02e+12	2.73e+12	1.68e+12	1.14e+12
57	1.00e+00	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
58	1.00e+00	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12

59	1.00e+00	Li	0.00e+00	2.53e+01	3.59e+01	8.61e+08	9.23e+10	1.25e+11
60	1.00e+00	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
61	1.00e+00	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	3.79e+09	1.15e+10
62	1.00e+00	O	1.88e+04	2.73e+04	7.03e+04	2.47e+06	1.11e+06	7.75e+05
63	1.00e+00	Zn	2.78e+08	1.81e+10	1.06e+11	9.73e+11	1.05e+12	1.37e+12
64	2.40e+01	As	0.00e+00	2.38e+00	1.71e+01	0.00e+00	0.00e+00	0.00e+00
65	2.40e+01	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
66	2.40e+01	Be	0.00e+00	1.32e+03	1.88e+03	1.44e+11	9.32e+10	5.45e+10
67	2.40e+01	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
68	2.40e+01	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.23e+01	8.35e+06
69	2.40e+01	Cu	0.00e+00	0.00e+00	2.63e+05	5.82e+09	2.03e+10	6.84e+10
70	2.40e+01	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.70e+05
71	2.40e+01	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
72	2.40e+01	Ge	3.25e+09	6.92e+11	2.42e+12	2.68e+12	1.46e+12	1.05e+12
73	2.40e+01	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
74	2.40e+01	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
75	2.40e+01	Li	0.00e+00	4.08e+01	5.78e+01	2.75e+09	9.34e+10	1.25e+11
76	2.40e+01	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
77	2.40e+01	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	9.80e+09	2.94e+10
78	2.40e+01	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
79	2.40e+01	Zn	2.78e+08	1.81e+10	1.06e+11	1.57e+12	1.72e+12	2.09e+12
80	1.20e+02	As	0.00e+00	0.00e+00	5.05e+00	0.00e+00	0.00e+00	0.00e+00
81	1.20e+02	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
82	1.20e+02	Be	0.00e+00	1.25e+03	1.77e+03	1.35e+11	8.77e+10	5.21e+10
83	1.20e+02	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
84	1.20e+02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.14e+01	8.33e+06
85	1.20e+02	Cu	0.00e+00	0.00e+00	3.56e+05	8.43e+09	1.76e+10	5.79e+10
86	1.20e+02	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.70e+05
87	1.20e+02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
88	1.20e+02	Ge	2.69e+09	3.07e+11	1.26e+12	2.53e+12	1.03e+12	8.33e+11
89	1.20e+02	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
90	1.20e+02	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
91	1.20e+02	Li	0.00e+00	1.15e+02	1.63e+02	1.18e+10	9.89e+10	1.28e+11
92	1.20e+02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
93	1.20e+02	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.60e+10
94	1.20e+02	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
95	1.20e+02	Zn	2.78e+08	1.81e+10	1.06e+11	1.58e+12	2.28e+12	2.62e+12
96	2.40e+02	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
97	2.40e+02	Be	0.00e+00	1.11e+03	1.58e+03	1.19e+11	7.77e+10	4.78e+10
98	2.40e+02	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
99	2.40e+02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.13e+01	8.30e+06
100	2.40e+02	Cu	0.00e+00	0.00e+00	5.40e+05	1.36e+10	2.04e+10	6.00e+10
101	2.40e+02	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.70e+05
102	2.40e+02	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
103	2.40e+02	Ge	1.96e+09	1.52e+11	8.19e+11	2.46e+12	9.48e+11	7.88e+11
104	2.40e+02	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
105	2.40e+02	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
106	2.40e+02	Li	0.00e+00	2.51e+02	3.55e+02	2.84e+10	1.09e+11	1.32e+11
107	2.40e+02	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
108	2.40e+02	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.60e+10
109	2.40e+02	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
110	2.40e+02	Zn	2.78e+08	1.81e+10	1.06e+11	1.59e+12	2.54e+12	2.87e+12
111	1.20e+03	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
112	1.20e+03	Be	0.00e+00	6.47e+02	9.27e+02	6.19e+10	4.34e+10	3.29e+10
113	1.20e+03	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
114	1.20e+03	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.09e+01	8.17e+06

115	1.20e+03	Cu	0.00e+00	0.00e+00	1.38e+06	3.73e+10	3.45e+10	7.10e+10
116	1.20e+03	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e+04	8.69e+05
117	1.20e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
118	1.20e+03	Ge	1.17e+09	1.11e+10	4.70e+11	2.33e+12	9.01e+11	7.47e+11
119	1.20e+03	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
120	1.20e+03	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
121	1.20e+03	Li	0.00e+00	7.17e+02	1.01e+03	8.52e+10	1.43e+11	1.47e+11
122	1.20e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
123	1.20e+03	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.60e+10
124	1.20e+03	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
125	1.20e+03	Zn	2.78e+08	1.81e+10	1.06e+11	1.67e+12	2.59e+12	2.91e+12
126	2.40e+03	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
127	2.40e+03	Be	0.00e+00	2.78e+02	3.96e+02	1.68e+10	1.61e+10	2.10e+10
128	2.40e+03	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
129	2.40e+03	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.01e+01	7.90e+06
130	2.40e+03	Cu	0.00e+00	0.00e+00	2.75e+06	7.58e+10	5.73e+10	8.89e+10
131	2.40e+03	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.75e+04	8.69e+05
132	2.40e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
133	2.40e+03	Ge	1.13e+09	4.02e+09	4.47e+11	2.16e+12	8.58e+11	7.00e+11
134	2.40e+03	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.53e+12
135	2.40e+03	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
136	2.40e+03	Li	0.00e+00	1.09e+03	1.54e+03	1.30e+11	1.71e+11	1.59e+11
137	2.40e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
138	2.40e+03	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.60e+10
139	2.40e+03	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
140	2.40e+03	Zn	2.78e+08	1.81e+10	1.06e+11	1.79e+12	2.61e+12	2.94e+12
141	8.76e+03	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
142	8.76e+03	Be	0.00e+00	1.41e+02	2.00e+02	1.62e+08	6.06e+09	1.66e+10
143	8.76e+03	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
144	8.76e+03	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.74e+01	6.99e+06
145	8.76e+03	Cu	0.00e+00	0.00e+00	5.41e+06	1.52e+11	1.02e+11	1.24e+11
146	8.76e+03	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.75e+04	8.69e+05
147	8.76e+03	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
148	8.76e+03	Ge	1.13e+09	3.99e+09	4.47e+11	1.83e+12	7.72e+11	6.05e+11
149	8.76e+03	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.52e+12
150	8.76e+03	He	3.72e+09	8.19e+10	6.97e+11	9.70e+11	1.43e+12	2.02e+12
151	8.76e+03	Li	0.00e+00	1.22e+03	1.73e+03	1.47e+11	1.81e+11	1.63e+11
152	8.76e+03	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
153	8.76e+03	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.60e+10
154	8.76e+03	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
155	8.76e+03	Zn	2.78e+08	1.81e+10	1.06e+11	2.05e+12	2.65e+12	3.00e+12
156	1.75e+04	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
157	1.75e+04	Be	0.00e+00	1.39e+02	1.98e+02	2.12e+04	5.98e+09	1.66e+10
158	1.75e+04	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
159	1.75e+04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.30e+01	5.51e+06
160	1.75e+04	Cu	0.00e+00	0.00e+00	6.60e+06	1.88e+11	1.24e+11	1.41e+11
161	1.75e+04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.75e+04	8.69e+05
162	1.75e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
163	1.75e+04	Ge	1.13e+09	3.99e+09	4.47e+11	1.64e+12	7.24e+11	5.52e+11
164	1.75e+04	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.53e+12	7.52e+12
165	1.75e+04	He	3.72e+09	8.19e+10	6.97e+11	9.71e+11	1.44e+12	2.03e+12
166	1.75e+04	Li	0.00e+00	1.22e+03	1.74e+03	1.47e+11	1.81e+11	1.63e+11
167	1.75e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
168	1.75e+04	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.60e+10
169	1.75e+04	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
170	1.75e+04	Zn	2.78e+08	1.81e+10	1.06e+11	2.20e+12	2.68e+12	3.04e+12

171	4.38e+04	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
172	4.38e+04	Be	0.00e+00	1.39e+02	1.98e+02	4.25e+03	5.98e+09	1.66e+10
173	4.38e+04	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
174	4.38e+04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.58e+01	3.13e+06
175	4.38e+04	Cu	0.00e+00	0.00e+00	6.91e+06	1.93e+11	1.27e+11	1.43e+11
176	4.38e+04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.75e+04	8.69e+05
177	4.38e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
178	4.38e+04	Ge	1.13e+09	3.99e+09	4.47e+11	1.61e+12	7.15e+11	5.43e+11
179	4.38e+04	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.52e+12	7.51e+12
180	4.38e+04	He	3.72e+09	8.19e+10	6.97e+11	9.71e+11	1.44e+12	2.03e+12
181	4.38e+04	Li	0.00e+00	1.22e+03	1.74e+03	1.47e+11	1.81e+11	1.63e+11
182	4.38e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
183	4.38e+04	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.59e+10
184	4.38e+04	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
185	4.38e+04	Zn	2.78e+08	1.81e+10	1.06e+11	2.23e+12	2.68e+12	3.05e+12
186	8.76e+04	B	0.00e+00	5.78e+10	5.85e+11	3.66e+11	2.85e+11	1.88e+11
187	8.76e+04	Be	0.00e+00	1.39e+02	1.98e+02	4.25e+03	5.98e+09	1.66e+10
188	8.76e+04	C	3.45e+09	1.03e+10	9.70e+10	1.15e+12	1.19e+12	9.74e+11
189	8.76e+04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.02e+01	1.25e+06
190	8.76e+04	Cu	0.00e+00	0.00e+00	6.92e+06	1.93e+11	1.27e+11	1.43e+11
191	8.76e+04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.75e+04	8.69e+05
192	8.76e+04	Ga	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
193	8.76e+04	Ge	1.13e+09	3.99e+09	4.47e+11	1.61e+12	7.15e+11	5.43e+11
194	8.76e+04	H	0.00e+00	1.24e+12	1.34e+12	4.54e+12	6.52e+12	7.50e+12
195	8.76e+04	He	3.72e+09	8.19e+10	6.97e+11	9.72e+11	1.45e+12	2.04e+12
196	8.76e+04	Li	0.00e+00	1.22e+03	1.74e+03	1.47e+11	1.81e+11	1.63e+11
197	8.76e+04	N	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22	4.42e+22
198	8.76e+04	Ni	0.00e+00	0.00e+00	5.55e+05	1.20e+09	1.20e+10	3.59e+10
199	8.76e+04	O	1.88e+04	2.73e+04	6.61e+04	2.47e+06	1.11e+06	7.75e+05
200	8.76e+04	Zn	2.78e+08	1.81e+10	1.06e+11	2.23e+12	2.68e+12	3.05e+12

Table 4 Temporal elemental impurity concentrations [atoms/cm^3] in Ga_2O_3 produced from 1 hour of neutron irradiation. This table is extended in Table 5.

	Time [hr]	Element	EBR-2	252-Cf	BWR-MOX-Gd-40GWd	PWR-MOX-40GWd	PWR-UO2-40GWd	Phenix
0	2.78e-04	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
1	2.78e-04	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
2	2.78e-04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
3	2.78e-04	Cu	2.34e+08	1.31e+09	4.10e+08	4.22e+08	3.74e+08	2.60e+05
4	2.78e-04	F	8.32e+05	1.59e+05	5.07e+05	4.97e+05	4.99e+05	3.07e+05
5	2.78e-04	Ga	7.56e+22	7.56e+22	7.56e+22	7.56e+22	7.56e+22	7.56e+22
6	2.78e-04	Ge	2.73e+09	1.04e+09	3.65e+10	3.75e+10	3.85e+10	8.10e+10
7	2.78e-04	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
8	2.78e-04	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
9	2.78e-04	N	1.34e+06	8.61e+07	2.14e+07	2.25e+07	1.83e+07	8.42e+03
10	2.78e-04	Ni	0.00e+00	8.68e+02	2.38e+02	2.57e+02	1.97e+02	0.00e+00
11	2.78e-04	O	1.13e+23	1.13e+23	1.13e+23	1.13e+23	1.13e+23	1.13e+23
12	2.78e-04	Zn	7.98e+08	4.37e+09	1.51e+09	1.55e+09	1.41e+09	3.25e+08
13	1.67e-02	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
14	1.67e-02	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
15	1.67e-02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
16	1.67e-02	Cu	2.04e+08	1.14e+09	3.57e+08	3.67e+08	3.26e+08	2.28e+05
17	1.67e-02	F	1.18e+06	2.30e+05	7.32e+05	7.19e+05	7.21e+05	4.20e+05
18	1.67e-02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
19	1.67e-02	Ge	5.92e+09	2.25e+09	7.93e+10	8.13e+10	8.35e+10	1.75e+11

20	1.67e-02	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
21	1.67e-02	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
22	1.67e-02	N	1.39e+06	5.45e+07	1.36e+07	1.43e+07	1.16e+07	5.90e+03
23	1.67e-02	Ni	0.00e+00	8.64e+02	2.37e+02	2.55e+02	1.97e+02	0.00e+00
24	1.67e-02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
25	1.67e-02	Zn	8.35e+08	4.52e+09	1.72e+09	1.77e+09	1.63e+09	7.00e+08
26	1.67e-01	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
27	1.67e-01	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
28	1.67e-01	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
29	1.67e-01	Cu	5.56e+07	3.22e+08	9.66e+07	9.95e+07	8.82e+07	6.38e+04
30	1.67e-01	F	1.31e+06	2.49e+05	7.94e+05	7.79e+05	7.81e+05	4.92e+05
31	1.67e-01	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
32	1.67e-01	Ge	3.25e+10	1.24e+10	4.39e+11	4.50e+11	4.62e+11	9.64e+11
33	1.67e-01	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
34	1.67e-01	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
35	1.67e-01	N	1.39e+06	5.40e+07	1.34e+07	1.41e+07	1.14e+07	5.59e+03
36	1.67e-01	Ni	0.00e+00	8.26e+02	2.27e+02	2.44e+02	1.88e+02	0.00e+00
37	1.67e-01	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
38	1.67e-01	Zn	1.04e+09	5.22e+09	3.35e+09	3.44e+09	3.31e+09	3.84e+09
39	1.00e+00	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
40	1.00e+00	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
41	1.00e+00	Cu	2.59e+05	2.56e+07	6.34e+06	6.67e+06	5.43e+06	2.51e+03
42	1.00e+00	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
43	1.00e+00	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
44	1.00e+00	Ge	9.44e+10	3.57e+10	1.29e+12	1.32e+12	1.36e+12	2.87e+12
45	1.00e+00	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
46	1.00e+00	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
47	1.00e+00	N	1.39e+06	5.40e+07	1.34e+07	1.41e+07	1.14e+07	5.59e+03
48	1.00e+00	Ni	0.00e+00	6.27e+02	1.72e+02	1.85e+02	1.43e+02	0.00e+00
49	1.00e+00	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
50	1.00e+00	Zn	1.16e+09	5.14e+09	6.44e+09	6.61e+09	6.56e+09	1.11e+10
51	2.40e+01	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
52	2.40e+01	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
53	2.40e+01	Cu	2.39e+05	2.54e+07	6.28e+06	6.61e+06	5.38e+06	2.48e+03
54	2.40e+01	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
55	2.40e+01	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
56	2.40e+01	Ge	1.42e+11	5.20e+10	2.48e+12	2.54e+12	2.65e+12	5.19e+12
57	2.40e+01	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
58	2.40e+01	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
59	2.40e+01	N	1.39e+06	5.40e+07	1.34e+07	1.41e+07	1.14e+07	5.65e+03
60	2.40e+01	Ni	0.00e+00	2.48e+00	1.11e+00	1.20e+00	0.00e+00	0.00e+00
61	2.40e+01	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
62	2.40e+01	Zn	8.20e+08	3.70e+09	6.45e+09	6.63e+09	6.63e+09	1.21e+10
63	1.20e+02	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
64	1.20e+02	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
65	1.20e+02	Cu	2.38e+05	2.48e+07	6.14e+06	6.46e+06	5.27e+06	2.41e+03
66	1.20e+02	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
67	1.20e+02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
68	1.20e+02	Ge	1.59e+11	5.77e+10	2.98e+12	3.06e+12	3.20e+12	6.20e+12
69	1.20e+02	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
70	1.20e+02	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
71	1.20e+02	N	1.39e+06	5.40e+07	1.34e+07	1.41e+07	1.14e+07	5.94e+03
72	1.20e+02	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
73	1.20e+02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
74	1.20e+02	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10
75	2.40e+02	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00

76	2.40e+02	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
77	2.40e+02	Cu	2.38e+05	2.46e+07	6.10e+06	6.42e+06	5.23e+06	2.39e+03
78	2.40e+02	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
79	2.40e+02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
80	2.40e+02	Ge	1.59e+11	5.78e+10	2.99e+12	3.06e+12	3.21e+12	6.21e+12
81	2.40e+02	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
82	2.40e+02	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
83	2.40e+02	N	1.39e+06	5.40e+07	1.34e+07	1.41e+07	1.14e+07	6.52e+03
84	2.40e+02	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
85	2.40e+02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
86	2.40e+02	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10
87	1.20e+03	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
88	1.20e+03	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
89	1.20e+03	Cu	2.38e+05	2.46e+07	6.09e+06	6.41e+06	5.23e+06	2.39e+03
90	1.20e+03	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
91	1.20e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
92	1.20e+03	Ge	1.59e+11	5.78e+10	2.99e+12	3.06e+12	3.21e+12	6.21e+12
93	1.20e+03	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
94	1.20e+03	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
95	1.20e+03	N	1.39e+06	5.40e+07	1.34e+07	1.42e+07	1.14e+07	9.40e+03
96	1.20e+03	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
97	1.20e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
98	1.20e+03	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10
99	2.40e+03	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
100	2.40e+03	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
101	2.40e+03	Cu	2.38e+05	2.46e+07	6.09e+06	6.41e+06	5.23e+06	2.39e+03
102	2.40e+03	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
103	2.40e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
104	2.40e+03	Ge	1.59e+11	5.78e+10	2.99e+12	3.06e+12	3.21e+12	6.21e+12
105	2.40e+03	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
106	2.40e+03	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
107	2.40e+03	N	1.40e+06	5.41e+07	1.35e+07	1.42e+07	1.15e+07	1.52e+04
108	2.40e+03	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
109	2.40e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
110	2.40e+03	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10
111	8.76e+03	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
112	8.76e+03	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
113	8.76e+03	Cu	2.38e+05	2.46e+07	6.09e+06	6.41e+06	5.23e+06	2.39e+03
114	8.76e+03	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
115	8.76e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
116	8.76e+03	Ge	1.59e+11	5.78e+10	2.99e+12	3.06e+12	3.21e+12	6.21e+12
117	8.76e+03	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
118	8.76e+03	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
119	8.76e+03	N	1.41e+06	5.41e+07	1.37e+07	1.44e+07	1.18e+07	3.63e+04
120	8.76e+03	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
121	8.76e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
122	8.76e+03	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10
123	1.75e+04	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
124	1.75e+04	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.93e+08
125	1.75e+04	Cu	2.38e+05	2.46e+07	6.09e+06	6.41e+06	5.23e+06	2.39e+03
126	1.75e+04	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
127	1.75e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
128	1.75e+04	Ge	1.59e+11	5.78e+10	2.99e+12	3.06e+12	3.21e+12	6.21e+12
129	1.75e+04	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
130	1.75e+04	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
131	1.75e+04	N	1.45e+06	5.41e+07	1.41e+07	1.48e+07	1.24e+07	7.84e+04

132	1.75e+04	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
133	1.75e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
134	1.75e+04	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10
135	4.38e+04	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
136	4.38e+04	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.92e+08
137	4.38e+04	Cu	2.38e+05	2.46e+07	6.09e+06	6.41e+06	5.23e+06	2.39e+03
138	4.38e+04	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
139	4.38e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
140	4.38e+04	Ge	1.59e+11	5.78e+10	2.99e+12	3.06e+12	3.21e+12	6.21e+12
141	4.38e+04	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
142	4.38e+04	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
143	4.38e+04	N	1.54e+06	5.43e+07	1.52e+07	1.57e+07	1.39e+07	1.84e+05
144	4.38e+04	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
145	4.38e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
146	4.38e+04	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10
147	8.76e+04	Be	0.00e+00	2.66e+04	9.57e+03	1.03e+04	7.85e+03	0.00e+00
148	8.76e+04	C	1.30e+10	7.78e+10	2.67e+10	2.71e+10	2.57e+10	1.92e+08
149	8.76e+04	Cu	2.38e+05	2.46e+07	6.09e+06	6.41e+06	5.23e+06	2.39e+03
150	8.76e+04	F	1.31e+06	2.49e+05	7.93e+05	7.79e+05	7.81e+05	4.87e+05
151	8.76e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
152	8.76e+04	Ge	1.59e+11	5.78e+10	2.99e+12	3.06e+12	3.21e+12	6.21e+12
153	8.76e+04	H	7.63e+08	4.58e+09	1.41e+09	1.45e+09	1.29e+09	1.11e+06
154	8.76e+04	He	1.33e+10	7.92e+10	2.71e+10	2.75e+10	2.61e+10	1.93e+08
155	8.76e+04	N	1.72e+06	5.45e+07	1.72e+07	1.75e+07	1.70e+07	3.94e+05
156	8.76e+04	Ni	0.00e+00	3.33e+00	1.52e+00	1.64e+00	0.00e+00	0.00e+00
157	8.76e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
158	8.76e+04	Zn	7.24e+08	3.20e+09	6.29e+09	6.46e+09	6.47e+09	1.21e+10

Table 5 Temporal elemental impurity concentrations [atoms/cm^3] in Ga_2O_3 produced from 1 hour of neutron irradiation. This table is an extension of Table 4.

	Time [hr]	Element	ITER-DD	ITER-DT	JAEA-FNS	HFIR-highres	All_Fast	All_Thermal
0	2.78e-04	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
1	2.78e-04	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
2	2.78e-04	Co	0.00e+00	0.00e+00	3.25e+01	0.00e+00	0.00e+00	0.00e+00
3	2.78e-04	Cu	5.29e+08	1.73e+10	8.53e+10	1.53e+08	2.12e+04	1.89e+03
4	2.78e-04	F	5.09e+05	6.13e+05	5.41e+05	6.87e+05	1.17e+04	1.17e+06
5	2.78e-04	Ga	7.56e+22	7.56e+22	7.56e+22	7.56e+22	7.56e+22	7.56e+22
6	2.78e-04	Ge	1.91e+10	3.80e+10	3.82e+10	6.47e+10	1.22e+09	1.12e+11
7	2.78e-04	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
8	2.78e-04	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
9	2.78e-04	N	7.25e+08	2.37e+10	1.44e+11	7.01e+06	0.00e+00	6.85e+00
10	2.78e-04	Ni	3.05e+02	1.80e+04	4.47e+05	0.00e+00	0.00e+00	0.00e+00
11	2.78e-04	O	1.13e+23	1.13e+23	1.13e+23	1.13e+23	1.13e+23	1.13e+23
12	2.78e-04	Zn	2.28e+09	6.74e+10	3.12e+11	7.79e+08	5.05e+06	4.41e+08
13	1.67e-02	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
14	1.67e-02	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
15	1.67e-02	Co	0.00e+00	0.00e+00	2.76e+01	0.00e+00	0.00e+00	0.00e+00
16	1.67e-02	Cu	4.72e+08	1.55e+10	7.80e+10	1.33e+08	1.85e+04	1.66e+03
17	1.67e-02	F	7.37e+05	8.87e+05	7.81e+05	9.94e+05	1.75e+04	1.60e+06
18	1.67e-02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
19	1.67e-02	Ge	4.14e+10	8.25e+10	8.28e+10	1.41e+11	2.65e+09	2.42e+11
20	1.67e-02	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
21	1.67e-02	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
22	1.67e-02	N	5.75e+08	1.90e+10	1.24e+11	4.01e+06	0.00e+00	1.51e+01

23	1.67e-02	Ni	3.03e+02	1.79e+04	4.45e+05	0.00e+00	0.00e+00	0.00e+00
24	1.67e-02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
25	1.67e-02	Zn	2.52e+09	7.23e+10	3.36e+11	1.10e+09	1.09e+07	9.54e+08
26	1.67e-01	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
27	1.67e-01	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
28	1.67e-01	Co	0.00e+00	0.00e+00	1.28e+01	0.00e+00	0.00e+00	0.00e+00
29	1.67e-01	Cu	2.56e+08	8.34e+09	5.05e+10	3.46e+07	4.11e+03	5.14e+02
30	1.67e-01	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.81e+04	1.81e+06
31	1.67e-01	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
32	1.67e-01	Ge	2.28e+11	4.58e+11	4.58e+11	7.82e+11	1.47e+10	1.32e+12
33	1.67e-01	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
34	1.67e-01	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
35	1.67e-01	N	5.75e+08	1.90e+10	1.24e+11	3.93e+06	0.00e+00	9.73e+01
36	1.67e-01	Ni	2.90e+02	1.71e+04	4.25e+05	0.00e+00	0.00e+00	0.00e+00
37	1.67e-01	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
38	1.67e-01	Zn	4.36e+09	1.11e+11	5.30e+11	3.69e+09	6.00e+07	5.14e+09
39	1.00e+00	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
40	1.00e+00	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
41	1.00e+00	Cu	1.78e+08	6.01e+09	4.16e+10	1.83e+06	2.03e+02	5.36e+01
42	1.00e+00	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
43	1.00e+00	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
44	1.00e+00	Ge	6.72e+11	1.33e+12	1.29e+12	2.32e+12	4.22e+10	3.99e+12
45	1.00e+00	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
46	1.00e+00	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
47	1.00e+00	N	5.75e+08	1.90e+10	1.24e+11	3.93e+06	3.12e+00	5.91e+02
48	1.00e+00	Ni	2.20e+02	1.30e+04	3.23e+05	0.00e+00	0.00e+00	0.00e+00
49	1.00e+00	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
50	1.00e+00	Zn	1.01e+10	2.48e+11	1.27e+12	9.24e+09	1.69e+08	1.48e+10
51	2.40e+01	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
52	2.40e+01	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
53	2.40e+01	Cu	1.76e+08	5.94e+09	4.09e+10	1.82e+06	0.00e+00	0.00e+00
54	2.40e+01	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
55	2.40e+01	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
56	2.40e+01	Ge	1.27e+12	2.38e+12	1.43e+12	4.95e+12	5.71e+10	8.87e+12
57	2.40e+01	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
58	2.40e+01	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
59	2.40e+01	N	5.75e+08	1.90e+10	1.24e+11	3.93e+06	6.58e+01	1.24e+04
60	2.40e+01	Ni	0.00e+00	1.76e+01	4.96e+02	0.00e+00	0.00e+00	0.00e+00
61	2.40e+01	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
62	2.40e+01	Zn	1.47e+10	3.93e+11	2.08e+12	9.92e+09	1.86e+08	1.65e+10
63	1.20e+02	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
64	1.20e+02	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
65	1.20e+02	Cu	1.71e+08	5.77e+09	3.92e+10	1.81e+06	0.00e+00	0.00e+00
66	1.20e+02	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
67	1.20e+02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
68	1.20e+02	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
69	1.20e+02	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
70	1.20e+02	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
71	1.20e+02	N	5.75e+08	1.90e+10	1.24e+11	3.96e+06	3.79e+02	7.16e+04
72	1.20e+02	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
73	1.20e+02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
74	1.20e+02	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10
75	2.40e+02	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
76	2.40e+02	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
77	2.40e+02	Cu	1.70e+08	5.71e+09	3.87e+10	1.80e+06	0.00e+00	0.00e+00
78	2.40e+02	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06

79	2.40e+02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
80	2.40e+02	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
81	2.40e+02	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
82	2.40e+02	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
83	2.40e+02	N	5.75e+08	1.90e+10	1.24e+11	4.00e+06	1.01e+03	1.90e+05
84	2.40e+02	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
85	2.40e+02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
86	2.40e+02	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10
87	1.20e+03	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
88	1.20e+03	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
89	1.20e+03	Cu	1.70e+08	5.71e+09	3.87e+10	1.80e+06	0.00e+00	0.00e+00
90	1.20e+03	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
91	1.20e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
92	1.20e+03	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
93	1.20e+03	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
94	1.20e+03	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
95	1.20e+03	N	5.75e+08	1.90e+10	1.24e+11	4.24e+06	4.14e+03	7.82e+05
96	1.20e+03	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
97	1.20e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
98	1.20e+03	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10
99	2.40e+03	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
100	2.40e+03	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
101	2.40e+03	Cu	1.70e+08	5.71e+09	3.87e+10	1.80e+06	0.00e+00	0.00e+00
102	2.40e+03	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
103	2.40e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
104	2.40e+03	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
105	2.40e+03	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
106	2.40e+03	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
107	2.40e+03	N	5.75e+08	1.90e+10	1.24e+11	4.71e+06	1.04e+04	1.97e+06
108	2.40e+03	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
109	2.40e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
110	2.40e+03	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10
111	8.76e+03	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
112	8.76e+03	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
113	8.76e+03	Cu	1.70e+08	5.71e+09	3.87e+10	1.80e+06	0.00e+00	0.00e+00
114	8.76e+03	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
115	8.76e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
116	8.76e+03	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
117	8.76e+03	H	4.10e+09	1.27e+11	6.04e+11	5.41e+08	6.39e+04	5.74e+00
118	8.76e+03	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
119	8.76e+03	N	5.75e+08	1.90e+10	1.24e+11	6.41e+06	3.33e+04	6.29e+06
120	8.76e+03	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
121	8.76e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
122	8.76e+03	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10
123	1.75e+04	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
124	1.75e+04	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.56e+10
125	1.75e+04	Cu	1.70e+08	5.71e+09	3.87e+10	1.80e+06	0.00e+00	0.00e+00
126	1.75e+04	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
127	1.75e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
128	1.75e+04	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
129	1.75e+04	H	4.10e+09	1.27e+11	6.03e+11	5.41e+08	6.39e+04	5.74e+00
130	1.75e+04	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
131	1.75e+04	N	5.75e+08	1.90e+10	1.24e+11	9.83e+06	7.90e+04	1.49e+07
132	1.75e+04	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
133	1.75e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
134	1.75e+04	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10

135	4.38e+04	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
136	4.38e+04	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.55e+10
137	4.38e+04	Cu	1.70e+08	5.71e+09	3.87e+10	1.80e+06	0.00e+00	0.00e+00
138	4.38e+04	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
139	4.38e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
140	4.38e+04	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
141	4.38e+04	H	4.10e+09	1.27e+11	6.03e+11	5.41e+08	6.39e+04	5.74e+00
142	4.38e+04	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
143	4.38e+04	N	5.76e+08	1.90e+10	1.24e+11	1.84e+07	1.93e+05	3.65e+07
144	4.38e+04	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
145	4.38e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
146	4.38e+04	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10
147	8.76e+04	Be	7.18e+00	7.93e+02	3.20e+04	0.00e+00	0.00e+00	0.00e+00
148	8.76e+04	C	1.04e+10	3.29e+11	1.60e+12	2.35e+10	1.88e+08	3.55e+10
149	8.76e+04	Cu	1.70e+08	5.71e+09	3.87e+10	1.80e+06	0.00e+00	0.00e+00
150	8.76e+04	F	7.99e+05	9.62e+05	8.46e+05	1.08e+06	1.80e+04	1.81e+06
151	8.76e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
152	8.76e+04	Ge	1.50e+12	2.79e+12	1.44e+12	6.06e+12	6.26e+10	1.10e+13
153	8.76e+04	H	4.09e+09	1.27e+11	6.02e+11	5.41e+08	6.39e+04	5.74e+00
154	8.76e+04	He	1.10e+10	3.49e+11	1.69e+12	2.37e+10	1.88e+08	3.56e+10
155	8.76e+04	N	5.76e+08	1.90e+10	1.24e+11	3.54e+07	4.22e+05	7.97e+07
156	8.76e+04	Ni	0.00e+00	0.00e+00	4.07e+01	0.00e+00	0.00e+00	0.00e+00
157	8.76e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
158	8.76e+04	Zn	1.46e+10	3.90e+11	2.07e+12	9.86e+09	1.86e+08	1.65e+10

Table 6 Temporal elemental impurity concentrations [atoms/cm^3] in Ga_2O_3 produced from 1 hour of proton irradiation.

Time [hr]	Element	2MeV	5MeV	10MeV	20MeV	30MeV	40MeV	
0	2.78e-04	As	0.00e+00	2.65e+00	3.74e+01	6.67e+00	0.00e+00	0.00e+00
1	2.78e-04	B	0.00e+00	0.00e+00	3.99e+05	3.75e+08	2.55e+09	3.23e+10
2	2.78e-04	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	1.73e+09
3	2.78e-04	C	0.00e+00	0.00e+00	5.41e+10	1.53e+12	1.00e+12	6.42e+11
4	2.78e-04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	8.35e+05	3.13e+07
5	2.78e-04	Cu	0.00e+00	0.00e+00	2.07e+05	4.50e+09	2.73e+10	8.36e+10
6	2.78e-04	F	8.82e+04	2.96e+09	2.08e+09	3.58e+08	1.41e+08	7.48e+07
7	2.78e-04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.43e+05
8	2.78e-04	Ga	7.56e+22	7.56e+22	7.56e+22	7.56e+22	7.56e+22	7.56e+22
9	2.78e-04	Ge	2.89e+09	7.61e+11	2.61e+12	2.13e+12	1.17e+12	7.30e+11
10	2.78e-04	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
11	2.78e-04	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
12	2.78e-04	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	4.49e+08
13	2.78e-04	N	2.52e+09	3.25e+09	2.66e+11	2.36e+11	5.80e+11	7.18e+11
14	2.78e-04	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	2.76e+09	8.31e+09
15	2.78e-04	O	1.13e+23	1.13e+23	1.13e+23	1.13e+23	1.13e+23	1.13e+23
16	2.78e-04	Zn	2.38e+08	1.55e+10	9.08e+10	2.91e+11	4.60e+11	7.57e+11
17	1.67e-02	As	0.00e+00	2.64e+00	3.68e+01	6.48e+00	0.00e+00	0.00e+00
18	1.67e-02	B	0.00e+00	0.00e+00	4.10e+05	3.75e+08	2.90e+09	3.49e+10
19	1.67e-02	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	1.73e+09
20	1.67e-02	C	0.00e+00	0.00e+00	7.12e+10	1.53e+12	1.00e+12	6.40e+11
21	1.67e-02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	8.28e+05	3.09e+07
22	1.67e-02	Cu	0.00e+00	0.00e+00	2.07e+05	4.50e+09	2.72e+10	8.30e+10
23	1.67e-02	F	8.82e+04	2.89e+09	2.04e+09	2.76e+08	1.01e+08	5.46e+07
24	1.67e-02	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.43e+05
25	1.67e-02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
26	1.67e-02	Ge	2.89e+09	7.61e+11	2.61e+12	2.13e+12	1.18e+12	7.39e+11

27	1.67e-02	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
28	1.67e-02	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
29	1.67e-02	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	4.49e+08
30	1.67e-02	N	2.52e+09	3.25e+09	2.50e+11	2.82e+11	7.01e+11	8.28e+11
31	1.67e-02	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	2.77e+09	8.33e+09
32	1.67e-02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
33	1.67e-02	Zn	2.38e+08	1.55e+10	9.08e+10	3.02e+11	4.69e+11	7.65e+11
34	1.67e-01	As	0.00e+00	2.64e+00	3.21e+01	4.92e+00	0.00e+00	0.00e+00
35	1.67e-01	B	0.00e+00	0.00e+00	5.01e+05	3.75e+08	5.86e+09	5.69e+10
36	1.67e-01	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	1.73e+09
37	1.67e-01	C	0.00e+00	0.00e+00	1.93e+11	1.54e+12	1.00e+12	6.21e+11
38	1.67e-01	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.72e+05	2.93e+07
39	1.67e-01	Cu	0.00e+00	0.00e+00	2.07e+05	4.51e+09	2.66e+10	8.06e+10
40	1.67e-01	F	8.81e+04	2.65e+09	1.89e+09	1.67e+08	5.34e+07	2.94e+07
41	1.67e-01	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.43e+05
42	1.67e-01	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
43	1.67e-01	Ge	2.89e+09	7.60e+11	2.60e+12	2.20e+12	1.26e+12	8.12e+11
44	1.67e-01	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
45	1.67e-01	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
46	1.67e-01	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	4.49e+08
47	1.67e-01	N	2.52e+09	3.25e+09	1.30e+11	3.89e+11	9.87e+11	1.10e+12
48	1.67e-01	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	2.84e+09	8.57e+09
49	1.67e-01	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
50	1.67e-01	Zn	2.38e+08	1.55e+10	9.08e+10	4.03e+11	5.50e+11	8.43e+11
51	1.00e+00	As	0.00e+00	2.61e+00	2.17e+01	1.33e+00	0.00e+00	0.00e+00
52	1.00e+00	B	0.00e+00	0.00e+00	6.98e+05	3.75e+08	1.22e+10	1.04e+11
53	1.00e+00	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	1.72e+09
54	1.00e+00	C	0.00e+00	0.00e+00	3.11e+11	1.54e+12	9.99e+11	5.76e+11
55	1.00e+00	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.07e+05	2.16e+07
56	1.00e+00	Cu	0.00e+00	0.00e+00	2.08e+05	4.53e+09	2.57e+10	8.16e+10
57	1.00e+00	F	8.78e+04	1.89e+09	1.29e+09	1.15e+08	3.68e+07	2.03e+07
58	1.00e+00	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.43e+05
59	1.00e+00	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
60	1.00e+00	Ge	2.89e+09	7.51e+11	2.58e+12	2.34e+12	1.44e+12	9.74e+11
61	1.00e+00	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
62	1.00e+00	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
63	1.00e+00	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	4.50e+08
64	1.00e+00	N	2.52e+09	3.25e+09	1.13e+10	3.86e+11	9.95e+11	1.10e+12
65	1.00e+00	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	3.23e+09	9.79e+09
66	1.00e+00	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
67	1.00e+00	Zn	2.38e+08	1.55e+10	9.08e+10	8.31e+11	8.95e+11	1.17e+12
68	2.40e+01	As	0.00e+00	2.02e+00	1.45e+01	0.00e+00	0.00e+00	0.00e+00
69	2.40e+01	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
70	2.40e+01	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	1.70e+09
71	2.40e+01	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
72	2.40e+01	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	6.79e+01	7.13e+06
73	2.40e+01	Cu	0.00e+00	0.00e+00	2.24e+05	4.97e+09	1.74e+10	5.85e+10
74	2.40e+01	F	8.69e+04	1.30e+05	7.73e+05	3.08e+06	1.07e+06	6.09e+05
75	2.40e+01	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.43e+05
76	2.40e+01	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
77	2.40e+01	Ge	2.77e+09	5.88e+11	2.05e+12	2.29e+12	1.25e+12	8.95e+11
78	2.40e+01	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
79	2.40e+01	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
80	2.40e+01	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	4.72e+08
81	2.40e+01	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
82	2.40e+01	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	8.37e+09	2.51e+10

83	2.40e+01	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
84	2.40e+01	Zn	2.38e+08	1.55e+10	9.08e+10	1.34e+12	1.47e+12	1.78e+12
85	1.20e+02	As	0.00e+00	0.00e+00	4.28e+00	0.00e+00	0.00e+00	0.00e+00
86	1.20e+02	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
87	1.20e+02	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	1.60e+09
88	1.20e+02	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
89	1.20e+02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.54e+01	7.12e+06
90	1.20e+02	Cu	0.00e+00	0.00e+00	3.04e+05	7.20e+09	1.50e+10	4.95e+10
91	1.20e+02	F	8.71e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
92	1.20e+02	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.43e+05
93	1.20e+02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
94	1.20e+02	Ge	2.30e+09	2.78e+11	1.08e+12	2.16e+12	8.78e+11	7.12e+11
95	1.20e+02	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
96	1.20e+02	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
97	1.20e+02	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	5.77e+08
98	1.20e+02	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
99	1.20e+02	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
100	1.20e+02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
101	1.20e+02	Zn	2.38e+08	1.55e+10	9.08e+10	1.35e+12	1.95e+12	2.24e+12
102	2.40e+02	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
103	2.40e+02	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	1.41e+09
104	2.40e+02	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
105	2.40e+02	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.53e+01	7.09e+06
106	2.40e+02	Cu	0.00e+00	0.00e+00	4.61e+05	1.16e+10	1.74e+10	5.13e+10
107	2.40e+02	F	8.69e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
108	2.40e+02	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.43e+05
109	2.40e+02	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
110	2.40e+02	Ge	1.69e+09	1.31e+11	7.00e+11	2.10e+12	8.10e+11	6.73e+11
111	2.40e+02	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
112	2.40e+02	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
113	2.40e+02	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	7.68e+08
114	2.40e+02	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
115	2.40e+02	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
116	2.40e+02	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
117	2.40e+02	Zn	2.38e+08	1.55e+10	9.08e+10	1.36e+12	2.17e+12	2.45e+12
118	1.20e+03	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
119	1.20e+03	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	7.49e+08
120	1.20e+03	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
121	1.20e+03	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.50e+01	6.98e+06
122	1.20e+03	Cu	0.00e+00	0.00e+00	1.18e+06	3.19e+10	2.94e+10	6.07e+10
123	1.20e+03	F	8.69e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
124	1.20e+03	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.42e+05
125	1.20e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
126	1.20e+03	Ge	1.01e+09	9.32e+09	3.98e+11	1.99e+12	7.70e+11	6.38e+11
127	1.20e+03	H	1.06e+03	1.31e+08	2.15e+12	4.58e+12	6.23e+12	7.10e+12
128	1.20e+03	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
129	1.20e+03	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	1.43e+09
130	1.20e+03	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
131	1.20e+03	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
132	1.20e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
133	1.20e+03	Zn	2.38e+08	1.55e+10	9.08e+10	1.43e+12	2.21e+12	2.49e+12
134	2.40e+03	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
135	2.40e+03	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	2.27e+08
136	2.40e+03	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
137	2.40e+03	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.43e+01	6.75e+06
138	2.40e+03	Cu	0.00e+00	0.00e+00	2.35e+06	6.48e+10	4.89e+10	7.59e+10

139	2.40e+03	F	8.69e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
140	2.40e+03	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.42e+05
141	2.40e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
142	2.40e+03	Ge	9.65e+08	3.42e+09	3.82e+11	1.85e+12	7.33e+11	5.98e+11
143	2.40e+03	H	1.06e+03	1.30e+08	2.15e+12	4.58e+12	6.22e+12	7.10e+12
144	2.40e+03	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
145	2.40e+03	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	1.95e+09
146	2.40e+03	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
147	2.40e+03	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
148	2.40e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
149	2.40e+03	Zn	2.38e+08	1.55e+10	9.08e+10	1.53e+12	2.23e+12	2.51e+12
150	8.76e+03	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
151	8.76e+03	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	3.46e+07
152	8.76e+03	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
153	8.76e+03	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.20e+01	5.98e+06
154	8.76e+03	Cu	0.00e+00	0.00e+00	4.54e+06	1.26e+11	8.74e+10	1.06e+11
155	8.76e+03	F	8.69e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
156	8.76e+03	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.42e+05
157	8.76e+03	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
158	8.76e+03	Ge	9.64e+08	3.41e+09	3.82e+11	1.57e+12	6.59e+11	5.17e+11
159	8.76e+03	H	1.06e+03	1.27e+08	2.15e+12	4.58e+12	6.22e+12	7.10e+12
160	8.76e+03	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.57e+12
161	8.76e+03	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	2.14e+09
162	8.76e+03	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
163	8.76e+03	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
164	8.76e+03	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
165	8.76e+03	Zn	2.38e+08	1.55e+10	9.08e+10	1.74e+12	2.26e+12	2.57e+12
166	1.75e+04	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
167	1.75e+04	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	3.25e+07
168	1.75e+04	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
169	1.75e+04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.82e+01	4.71e+06
170	1.75e+04	Cu	0.00e+00	0.00e+00	5.63e+06	1.61e+11	1.05e+11	1.20e+11
171	1.75e+04	F	8.69e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
172	1.75e+04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.42e+05
173	1.75e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
174	1.75e+04	Ge	9.64e+08	3.41e+09	3.82e+11	1.40e+12	6.19e+11	4.72e+11
175	1.75e+04	H	1.06e+03	1.23e+08	2.15e+12	4.58e+12	6.22e+12	7.10e+12
176	1.75e+04	He	2.76e+09	1.87e+10	4.09e+11	1.82e+12	2.49e+12	2.58e+12
177	1.75e+04	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	2.14e+09
178	1.75e+04	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
179	1.75e+04	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
180	1.75e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
181	1.75e+04	Zn	2.38e+08	1.55e+10	9.08e+10	1.88e+12	2.29e+12	2.60e+12
182	4.38e+04	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
183	4.38e+04	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	3.25e+07
184	4.38e+04	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
185	4.38e+04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.21e+01	2.67e+06
186	4.38e+04	Cu	0.00e+00	0.00e+00	5.90e+06	1.65e+11	1.08e+11	1.22e+11
187	4.38e+04	F	8.69e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
188	4.38e+04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.42e+05
189	4.38e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
190	4.38e+04	Ge	9.64e+08	3.41e+09	3.82e+11	1.37e+12	6.11e+11	4.64e+11
191	4.38e+04	H	1.06e+03	1.13e+08	2.15e+12	4.58e+12	6.22e+12	7.09e+12
192	4.38e+04	He	2.76e+09	1.88e+10	4.09e+11	1.82e+12	2.50e+12	2.58e+12
193	4.38e+04	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	2.14e+09
194	4.38e+04	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12

195	4.38e+04	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
196	4.38e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
197	4.38e+04	Zn	2.38e+08	1.55e+10	9.08e+10	1.91e+12	2.29e+12	2.60e+12
198	8.76e+04	B	0.00e+00	0.00e+00	7.28e+05	3.75e+08	1.31e+10	1.11e+11
199	8.76e+04	Be	0.00e+00	0.00e+00	1.46e+06	1.82e+06	6.71e+06	3.25e+07
200	8.76e+04	C	0.00e+00	0.00e+00	3.13e+11	1.54e+12	9.98e+11	5.69e+11
201	8.76e+04	Co	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.72e+01	1.07e+06
202	8.76e+04	Cu	0.00e+00	0.00e+00	5.91e+06	1.65e+11	1.08e+11	1.22e+11
203	8.76e+04	F	8.69e+04	1.30e+05	6.95e+05	3.06e+06	1.06e+06	6.06e+05
204	8.76e+04	Fe	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e+04	7.42e+05
205	8.76e+04	Ga	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22	3.78e+22
206	8.76e+04	Ge	9.64e+08	3.41e+09	3.82e+11	1.37e+12	6.11e+11	4.64e+11
207	8.76e+04	H	1.06e+03	9.98e+07	2.15e+12	4.58e+12	6.21e+12	7.08e+12
208	8.76e+04	He	2.76e+09	1.88e+10	4.09e+11	1.83e+12	2.50e+12	2.59e+12
209	8.76e+04	Li	0.00e+00	0.00e+00	0.00e+00	5.24e+03	1.23e+07	2.14e+09
210	8.76e+04	N	2.52e+09	3.25e+09	9.18e+09	3.86e+11	9.95e+11	1.10e+12
211	8.76e+04	Ni	0.00e+00	0.00e+00	4.74e+05	1.02e+09	1.03e+10	3.07e+10
212	8.76e+04	O	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22	5.67e+22
213	8.76e+04	Zn	2.38e+08	1.55e+10	9.08e+10	1.91e+12	2.29e+12	2.60e+12