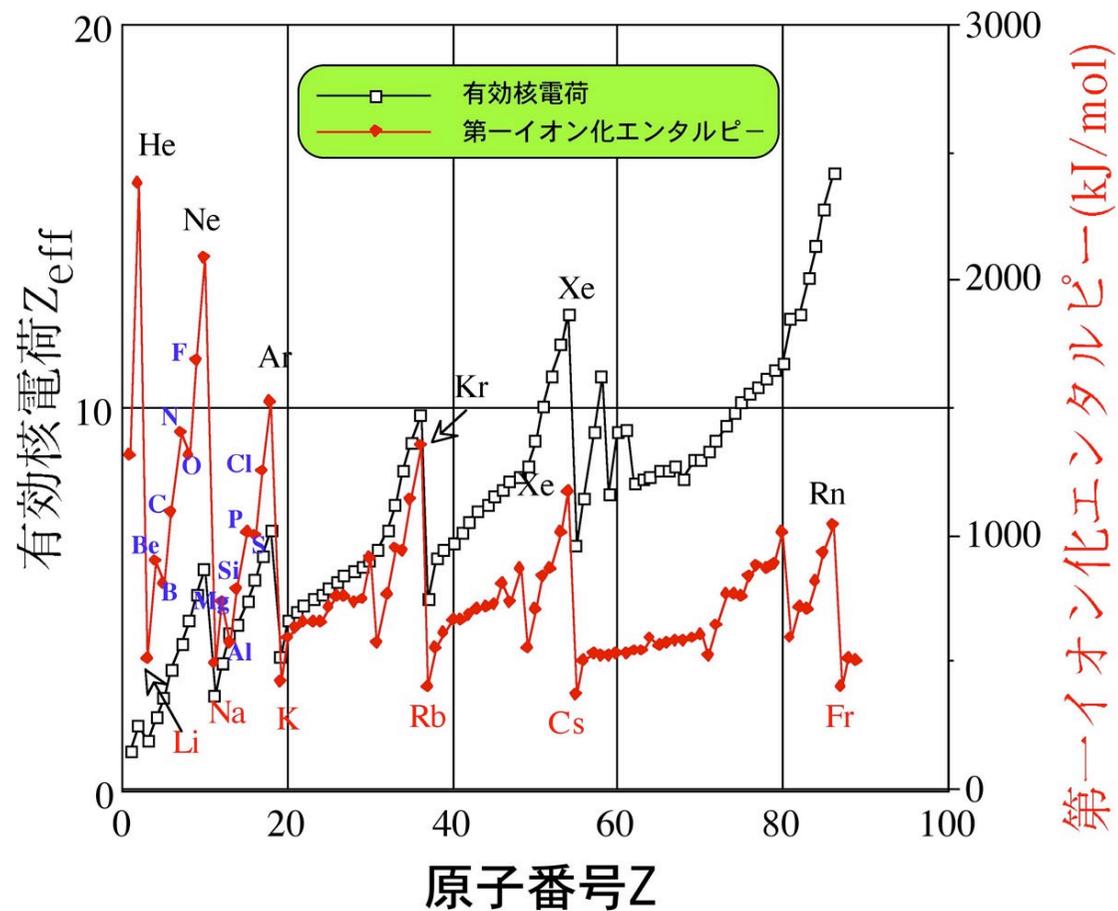


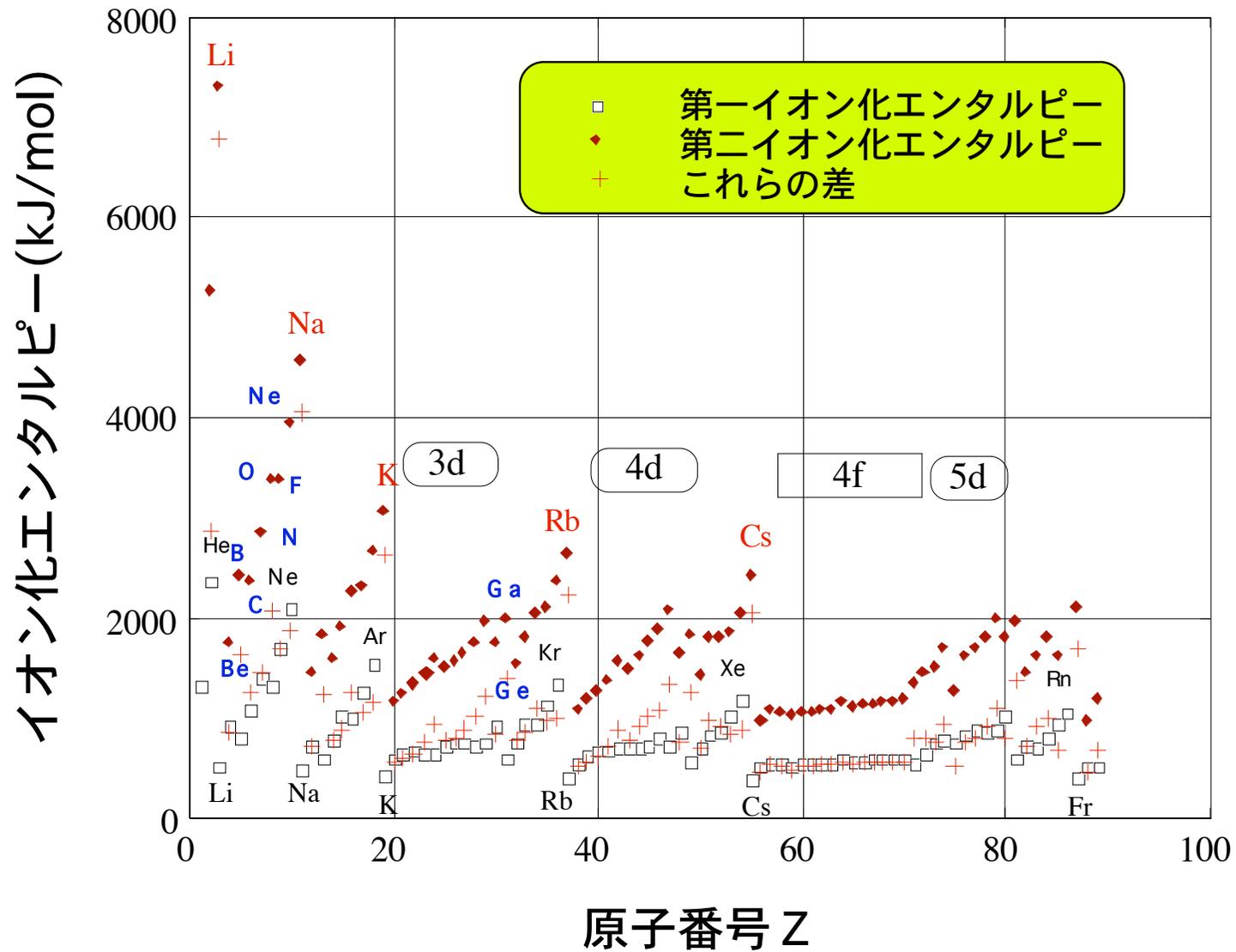
Z	元素	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII		
1	H	1.3120																							
2	He	2.3723	5.2394																						
3	Li	0.5203	7.2982	11.0149																					
4	Be	0.8995	1.7971	14.8487	21.8063																				
5	B	0.8006	2.6270	1.6298	23.0237	32.8266																			
6	C	1.0864	2.3526	4.6265	6.2226	37.8304	47.2749																		
7	N	1.4003	2.8961	4.5781	7.4731	9.4449	31.2864	64.3398																	
8	O	1.3149	1.3882	3.3004	7.4693	10.9895	11.3264	71.5343	84.0777																
9	F	1.6818	1.7942	6.0264	8.4077	11.8227	15.1640	17.8677	92.0076	106.4340															
10	Ne	2.0807	1.9521	6.122	9.370	12.178	13.238	19.999	23.069	115.3791	131.4314														
11	Na	0.4958	4.5624	6.912	9.544	13.353	16.610	20.115	25.489	28.934	141.2626	199.0745													
12	Mg	0.7377	1.4307	7.7328	10.540	13.628	17.999	21.704	25.626	31.643	25.462	189.2671													
13	Al	0.5778	1.8167	1.7446	11.578	14.831	18.378	23.295	27.459	31.861	38.467	61.634	261.2707	321.3143											
14	Si	0.7863	1.5771	1.2316	4.3555	16.891	19.789	23.786	29.252	33.877	38.733	66.372	54.072	51.026	271.7998	294.1928									
15	P	1.0118	1.9032	1.912	4.957	6.2739	21.289	25.397	29.854	31.867	40.939	61.705	54.482	62.874	68.230	341.0898	357.1359								
16	S	0.9998	2.231	1.361	4.964	7.613	8.4936	27.186	31.679	36.578	43.178	51.067	57.118	63.362	72.340	78.094	352.9913	380.7572							
17	Cl	1.2511	2.297	1.822	1.158	6.54	9.262	11.0183	13.685	18.998	23.963	31.072	38.652	46.199	72.918	81.672	88.6	397.6024	437.0623						
18	Ar	1.5203	2.6528	1.931	1.771	7.238	8.7838	11.9952	13.9417	40.760	46.187	54.431	61.889	68.894	73.848	81.130	93.4	39.77	444.8982	476.0613					
19	K	0.4189	1.8914	4.411	1.677	7.976	9.649	11.343	14.943	16.964	48.576	57.048	63.333	70.025	78.792	86.348	94.0	104.9	111.4	494.8873	537.7598				
20	Ca	0.9098	1.4924	4.9128	6.474	8.144	10.486	12.32	14.287	18.192	30.389	34.1055	46.180	72.893	80.064	89.347									
21	Sc	0.621	1.235	2.389	7.889	8.844	10.72	13.32	15.31	17.370	21.741	21.911	28.1257	71.967	83.187	90.733									
22	Ti	0.628	1.310	2.6323	4.1746	8.573	11.517	13.99	16.26	18.64	20.823	24.628	29.743	32.4435	86.442	93.980									
23	V	0.628	1.444	2.8280	4.5065	6.399	12.382	14.489	16.780	19.88	22.24	26.13	28.75	34.3	37.080	97.5138									
24	Cr	0.6228	1.466	2.987	4.74	6.69	8.738	15.54	17.82	20.19	23.38	27.60	30.34	33.15	39.0	42.00	109.63								
25	Mn	0.7724	1.3081	2.2884	4.94	6.99	9.2	11.508	18.556	21.40	23.96	28.62	31.92	34.83	37.84	44.1	47.23	122.16							
26	Fe	0.7394	1.561	2.6974	5.29	7.34	9.6	12.1	14.575	22.678	25.29	29.4	32.4	36.5	38.7	42.8	49.4	52.76	131.37						
27	Co	0.758	1.646	3.232	4.95	7.67	9.84	12.4	15.1	17.939	26.6	30.99	34.0	37.1	41.5	44.8	48.1	55.1	58.59	149.3					
28	Ni	0.7367	1.7130	3.393	5.30	7.28	10.4	12.8	15.6	18.6	21.66	25.7	31.58	38.7	42.6	46.7	50.2	53.7	61.1	64.7	163.8				
29	Cu	0.7439	1.9579	3.594	5.35	7.71	9.94	13.4	16.0	19.2	22.4	26.4	29.59	40.58	43.8	47.3	52.3	53.9	59.7	67.3	71.2	179.1			
30	Zn	0.9064	1.733	3.8327	5.73	7.97	10.4	12.9	16.8	19.6	23.0														
31	Ga	0.7788	1.979	2.983	6.3																				
32	Ge	0.7632	1.5372	1.380	4.430	9.82																			
33	As	0.944	1.7978	2.7325	4.837	6.893	12.31																		
34	Se	0.9409	2.043	1.5797	4.1435	6.39	7.883	14.89																	
35	Br	1.1389	2.10	1.5	4.56	5.76	8.51	9.938	18.60																
36	Kr	1.3507	2.3903	1.565	5.07	6.24	7.57	10.71	12.2	23.28															
37	Rb	0.4838	2.633	1.9	5.08	6.95	8.14	9.57	13.1	14.3	26.74	31.27													
38	Sr	0.5463	1.0843	4.31	5.5	6.91	8.76	10.2	11.80	13.6	17.3	19.9	36.09												
39	Y	0.648	1.181	1.980	3.96	7.43	8.97	11.3	12.4	14.1	18.4														
40	Zr	0.680	1.267	2.218	3.313	7.86																			
41	Nb	0.664	1.363	2.416	3.89	4.877	9.900	12.1																	
42	Mo	0.6839	1.558	1.621	4.477	3.91	6.6	12.23	14.8																
43	Tc	0.782	1.472	2.850																					
44	Ru	0.711	1.617	2.747																					
45	Rh	0.720	1.744	2.997																					
46	Pd	0.803	1.873	3.177																					
47	Ag	0.7318	2.074	3.361																					
48	Cd	0.8677	1.8314	3.618																					
49	In	0.5383	1.8206	2.783	5.2																				
50	Sn	0.7086	1.4138	2.9431	1.9300	6.974																			
51	Sb	0.8316	1.393	2.44	4.26	5.4	18.4																		
52	Te	0.8693	1.79	2.898	3.610	5.689	6.82	13.2																	
53	I	1.0084	1.8439	3.2																					
54	Xe	1.1704	2.046	3.10																					
55	Cs	0.3757	2.23																						
56	Ba	0.5029	0.96326																						

## イオン化エネルギー (MJ/mol)



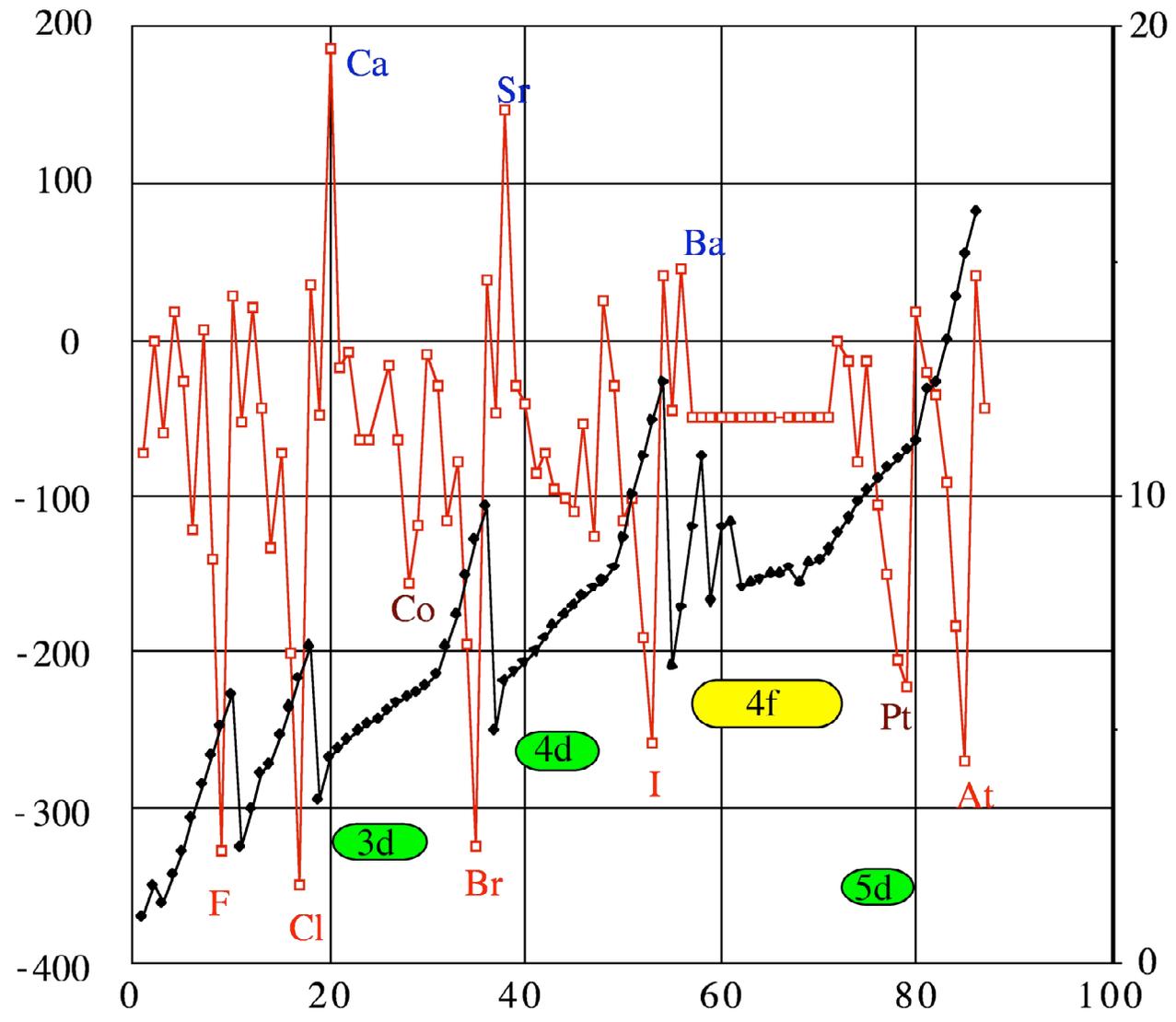
	$\Delta H_{1(+)}^i$	$Z_{eff} (ns^1)$	$n$
Li	513 kJ/mol	1.28	2
Na	496	2.51	3
K	419	3.50	4
Rb	403	4.98	5
Cs	376	6.36	6

第一イオン化エンタルピー  
と有効核電荷



第一イオン化エンタルピーと第二イオン化エンタルピー

(-)イオン化エンタルピー (kJ/mol)



有効核電荷  $Z_{\text{eff}}$

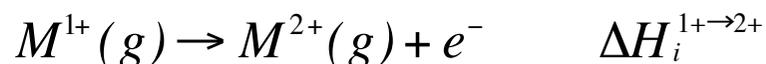
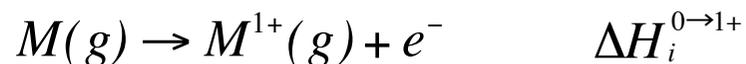
原子番号 Z

(-)イオン化エンタルピーと有効核電荷

# イオン化エンタルピー

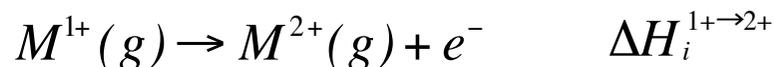
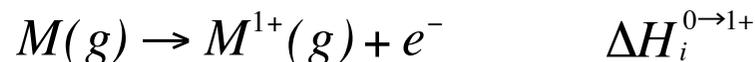
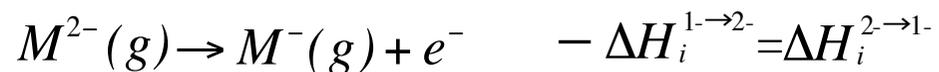
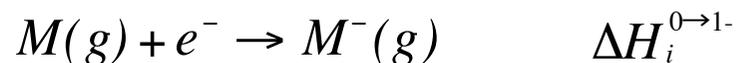
# イオン化エンタルピー

## ◎ (+) イオン化エンタルピー



Electron Affinity

## ◎ (-) イオン化エンタルピー (= -電子親和力)

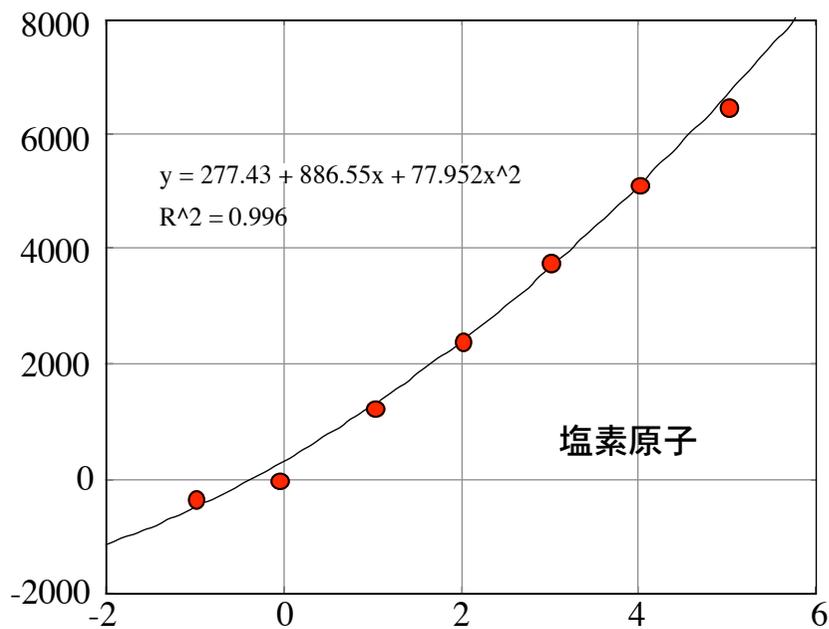
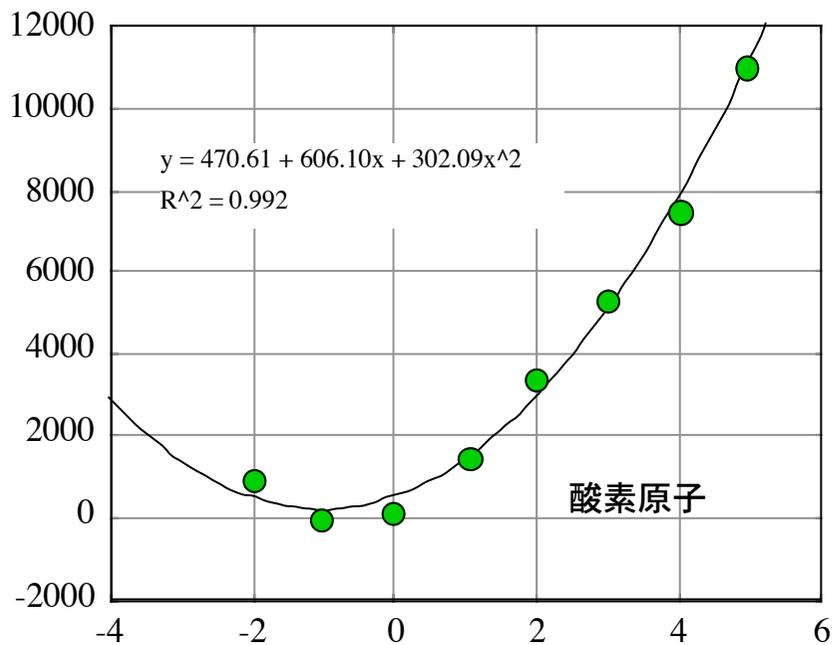


電子数減少



# イオン化エンタルピー と原子価

イオン化エンタルピー (kJ/mol)



原子価