



Agilent 7900

Agilent ICP-MS



Agilent 7800



Agilent 8900 ICP-QQQ

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	1 1.008 H hydrogen 13.60 -259 -253																	2 4.003 He helium 24.59 54.42 -269	1
2	3 6.94 Li lithium 5.39 181 75.64 1342	4 9.012 Be beryllium 9.32 1287 18.21 2468																	2
3	11 22.99 Na sodium 5.14 98 47.29 883	12 24.31 Mg magnesium 7.65 650 15.04 1090																	3
4	19 39.10 K potassium 4.34 64 31.63 759	20 40.08 Ca calcium 6.11 842 11.87 1484	21 44.96 Sc scandium 6.56 1541 12.80 2836	22 47.87 Ti titanium 6.83 1670 13.58 3287	23 50.94 V vanadium 6.75 1910 14.62 3407	24 52.00 Cr chromium 6.77 1907 16.49 2671	25 54.94 Mn manganese 7.43 1246 15.64 2061	26 55.85 Fe iron 7.90 1538 16.19 2861	27 58.93 Co cobalt 7.88 1495 17.08 2927	28 58.69 Ni nickel 7.64 1455 18.17 2913	29 63.55 Cu copper 7.73 1085 20.29 2560	30 65.38 Zn zinc 9.39 420 17.96 907							4
5	37 85.47 Rb rubidium 4.18 39.3 27.29 688	38 87.62 Sr strontium 5.69 777 11.03 1377	39 88.91 Y yttrium 6.22 1522 12.22 3345	40 91.22 Zr zirconium 6.63 1854 13.1 4406	41 92.91 Nb niobium 6.76 2477 14.0 4741	42 95.95 Mo molybdenum 7.09 2622 16.16 4639	43 (98) Tc technetium 7.28 2157 15.26 4262	44 101.1 Ru ruthenium 7.36 2333 16.76 4147	45 102.9 Rh rhodium 7.46 1963 18.08 3695	46 106.4 Pd palladium 8.34 1555 19.43 2963	47 107.9 Ag silver 7.58 962 21.48 2162	48 112.4 Cd cadmium 8.99 321 16.91 767	49 114.8 In indium 5.79 157 14.63 2586	50 118.7 Sn tin 7.34 232 14.63 2586	51 121.8 Sb antimony 8.61 631 16.63 1587	52 127.6 Te tellurium 9.01 450 18.60 988	53 126.9 I iodine 10.45 114 19.13 184	54 131.3 Xe xenon 12.13 -112 20.97 -108	5
6	55 132.9 Cs caesium 3.89 28.5 23.16 671	56 137.3 Ba barium 5.21 727 10.00 1845	57-71 L Lanthanides	72 178.5 Hf hafnium 6.83 2233 15.0 4600	73 180.9 Ta tantalum 7.55 3017 16.10 5555	74 183.8 W tungsten 7.86 3414 16.10 5555	75 186.2 Re rhenium 7.83 3185 16.10 5590	76 190.2 Os osmium 8.44 3033 18.56 3825	77 192.2 Ir iridium 8.97 2446 18.56 3825	78 195.1 Pt platinum 8.96 1768 20.2 2836	79 197.0 Au gold 9.23 1064 20.2 2836	80 200.6 Hg mercury 10.44 -39 18.76 357	81 204.4 Tl thallium 6.11 304 20.43 1473	82 207.2 Pb lead 7.42 327 15.03 1749	83 209.0 Bi bismuth 7.29 271 16.70 1564	84 (209) Po polonium 8.41 254 962	85 (210) At astatine 300 350	86 (222) Rn radon 10.75 -71 -62	6
7	87 (223) Fr francium 4.07 21 650	88 (226) Ra radium 5.28 696 10.15 1500	89-103 A Actinides	104 (267) Rf rutherfordium 6.0	105 (268) Db dubnium	106 (271) Sg seaborgium	107 (272) Bh bohrium	108 (270) Hs hassium	109 (276) Mt meitnerium	110 (281) Ds darmstadtium	111 (280) Rg roentgenium	112 (285) Cn copernicium	113 (284) Uut ununtrium	114 (289) Fl flerovium	115 (288) Uup ununpentium	116 (293) Lv livermorium	117 (294) Uus ununseptium	118 (294) Uuo ununoctium	7

	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
L	lanthanum 5.58 920 11.06 3464	cerium 5.54 799 10.85 3443	praseodymium 5.47 931 10.55 3520	neodymium 5.53 1016 10.72 3074	promethium 5.58 1042 10.90 3000	samarium 5.64 1072 11.07 1794	europium 5.67 822 11.25 1529	gadolinium 6.15 1313 12.09 3273	terbium 5.86 1359 11.52 3230	dysprosium 5.94 1412 11.67 2567	holmium 6.02 1472 11.80 2700	erbium 6.11 1529 11.93 2868	thulium 6.18 1545 12.05 1950	ytterbium 6.25 824 12.18 1196	lutetium 5.43 1663 13.90 3402	
A	actinium 5.17 1050 11.75 3200	thorium 6.31 1750 11.90 4785	protactinium 5.89 1572 10.60 4131	uranium 6.19 1135 10.60 4131	neptunium 6.27 644 3902	plutonium 6.03 640 11.20 3228	americium 5.97 1176 2011	curium 5.99 1345	berkelium 6.20 986	californium 6.28 900 11.80	einsteinium 6.42 860 12.0	fermium 6.50 1527	mendelevium 6.58 827	nobelium 6.65 827	lawrencium 4.90 1627	

atomic number	atomic weight
Element Symbol	
(eV) first ionization potential	(°C)/1 atm melting point
second ionization potential	boiling point

: synthetic



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Relative Isotopic Abundance Table

(unit: %)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
H	99.99	0.01															H
He			100														He
Li						7.59	92.41										Li
Be								100									Be
B									19.9	80.1							B
C												98.93	1.07				C
N														99.64	0.36		N
O																99.76	O
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
O	0.04	0.2															O
F			100														F
Ne				90.48	0.27	9.25											Ne
Na							100										Na
Mg								78.99	10.00	11.01							Mg
Al											100						Al
Si												92.22	4.69	3.09			Si
P															100		P
S																94.99	S
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
S	0.75	4.25		0.01													S
Cl			75.76		24.24												Cl
Ar				0.34		0.06											Ar
K							93.26	0.01	6.73								K
Ca								96.941		0.647	0.135	2.086		0.004		0.187	Ca
Sc												100					Sc
Ti													8.25	7.44	73.72		Ti
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
Ti	5.41	5.18															Ti
V		0.25	99.75														V
Cr		4.345		83.79	9.50	2.365											Cr
Mn						100											Mn
Fe							5.85			91.75	2.12	0.28					Fe
Co											100						Co
Ni												68.08		26.22	1.14	3.63	Ni
Cu																69.15	Cu
Zn																49.17	Zn
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
Cu	30.85																Cu
Zn		27.73	4.04	18.45		0.61											Zn
Ga					60.11		39.89										Ga
Ge						20.57		27.45	7.75	36.50		7.73					Ge
As											100						As
Se									0.89			9.37	7.63	23.77		49.61	Se
Br															50.69		Br
Kr														0.35		2.29	Kr
	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	
Se		8.73															Se
Br	49.31																Br
Kr		11.59	11.50	56.99		17.28											Kr
Rb					72.17		27.83										Rb
Sr				0.56		9.86	7.00	82.58									Sr
Y									100								Y
Zr										51.45	11.22	17.15		17.38		2.80	Zr
Nb												100					Nb
Mo											14.53		9.15	15.84	16.67		Mo
Ru															5.54		Ru

	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112		
Mo	9.60	24.39		9.82													Mo	
Ru		1.87	12.76	12.60	17.06	31.55		18.62									Ru	
Rh							100										Rh	
Pd						1.02		11.14	22.33	27.33		26.46		11.72			Pd	
Ag											51.84		48.16				Ag	
Cd										1.25		0.89		12.49	12.80	24.13	Cd	
Sn																0.97	Sn	
	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128		
Cd	12.22	28.73		7.49													Cd	
In	4.29		95.71														In	
Sn		0.66	0.34	14.54	7.68	24.22	8.59	32.58		4.63		5.79					Sn	
Sb									57.21		42.79						Sb	
Te								0.09		2.55	0.89	4.74	7.07	18.84		31.74	Te	
I														100			I	
Xe												0.09		0.09		1.91	Xe	
	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144		
Te		34.08															Te	
Xe	26.40	4.07	21.23	26.91		10.44		8.86									Xe	
Cs					100												Cs	
Ba		0.11		0.10		2.42	6.59	7.85	11.23	71.70							Ba	
La										0.09	99.91						La	
Ce								0.19		0.25		88.45		11.11			Ce	
Pr													100				Pr	
Nd														27.2	12.2	23.8	Nd	
Sm																3.07	Sm	
	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160		
Nd	8.3	17.2		5.7		5.6											Nd	
Sm			14.99	11.24	13.82	7.38		26.75		22.75							Sm	
Eu							47.81		52.19								Eu	
Gd								0.20		2.18	14.80	20.47	15.65	24.84		21.86	Gd	
Tb														100			Tb	
Dy												0.06		0.09		2.33	Dy	
	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176		
Dy	18.89	25.47	24.90	28.26													Dy	
Ho					100												Ho	
Er		0.14		1.60		33.50	22.87	26.98		14.91							Er	
Tm									100								Tm	
Yb								0.12		2.98	14.09	21.68	16.10	32.03		13.00	Yb	
Lu															97.40	2.60	Lu	
Hf														0.16		5.26	Hf	
	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192		
Hf	18.60	27.28	13.62	35.08													Hf	
Ta				0.01	99.99												Ta	
W				0.12		26.50	14.31	30.64		28.43							W	
Re									37.40		62.60						Re	
Os								0.02		1.59	1.96	13.24	16.15	26.26		40.78	Os	
Ir															37.3		Ir	
Pt														0.012		0.782	Pt	
	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208		
Ir	62.7																Ir	
Pt		32.86	33.78	25.21		7.356											Pt	
Au					100												Au	
Hg				0.15		9.97	16.87	23.10	13.18	29.86		6.87					Hg	
Tl												29.52		70.48			Tl	
Pb													1.4		24.1	22.1	52.4	Pb
	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224		
Bi	100																Bi	
	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240		
Th								100									Th	
U										0.005	0.720			99.274			U	

: recommended mass number (He mode)

