

PERIODIC TABLE

Atomic Properties of the Elements

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

Period	1	Frequently used fundamental physical constants For the most accurate values of these and other constants, visit physics.nist.gov/constants 1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of ¹³³Cs speed of light in vacuum <i>c</i> 299 792 458 m s⁻¹ (exact) Planck constant <i>h</i> 6.626 07 × 10⁻³⁴ J s (<i>h</i> = <i>h</i>/2<i>π</i>) elementary charge <i>e</i> 1.602 177 × 10⁻¹⁹ C electron mass <i>m_e</i> 9.109 38 × 10⁻³¹ kg <i>m_ec²</i> 0.510 999 MeV proton mass <i>m_p</i> 1.672 622 × 10⁻²⁷ kg fine-structure constant <i>α</i> 1/137.035 999 Rydberg constant <i>R_∞</i> 10 973 731.569 m⁻¹ <i>R_∞c</i> 3.289 841 960 × 10¹⁵ Hz <i>R_∞hc</i> 13.605 69 eV Boltzmann constant <i>k</i> 1.380 6 × 10⁻²³ J K⁻¹																Physical Measurement Laboratory www.nist.gov/pml																Standard Reference Data www.nist.gov/srd																2
	1	2																																		18														
	2	3		4																																		10												
	3	11		12																																		18												
	4	19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		36														
	5	37		38		39		40		41		42		43		44		45		46		47		48		49		50		51		52		53		54														
	6	55		56																																		86												
	7	87		88																																		118												
	8	101		102		103		104		105		106		107		108		109		110		111		112		113		114		115		116		117		118														
	9	119		120		121		122		123		124		125		126		127		128		129		130		131		132		133		134		135		136														
10	151		152		153		154		155		156		157		158		159		160		161		162		163		164		165		166		167		168															
11	171		172		173		174		175		176		177		178		179		180		181		182		183		184		185		186		187		188															
12	191		192		193		194		195		196		197		198		199		200		201		202		203		204		205		206		207		208															
13	211		212		213		214		215		216		217		218		219		220		221		222		223		224		225		226		227		228															
14	231		232		233		234		235		236		237		238		239		240		241		242		243		244		245		246		247		248															
15	251		252		253		254		255		256		257		258		259		260		261		262		263		264		265		266		267		268															
16	271		272		273		274		275		276		277		278		279		280		281		282		283		284		285		286		287		288															
17	291		292		293		294		295		296		297		298		299		300		301		302		303		304		305		306		307		308															
18	311		312		313		314		315		316		317		318		319		320		321		322		323		324		325		326		327		328															
19	331		332		333		334		335		336		337		338		339		340		341		342		343		344		345		346		347		348															
20	351		352		353		354		355		356		357		358		359		360		361		362		363		364		365		366		367		368															
21	371		372		373		374		375		376		377		378		379		380		381		382		383		384		385		386		387		388															
22	391		392		393		394		395		396		397		398		399		400		401		402		403		404		405		406		407		408															
23	411		412		413		414		415		416		417		418		419		420		421		422		423		424		425		426		427		428															
24	431		432		433		434		435		436		437		438		439		440		441		442		443		444		445		446		447		448															
25	451		452		453		454		455		456		457		458		459		460		461		462		463		464		465		466		467		468															
26	471		472		473		474		475		476		477		478		479		480		481		482		483		484		485		486		487		488															
27	491		492		493		494		495		496		497		498		499		500		501		502		503		504		505		506		507		508															
28	511		512		513		514		515		516		517		518		519		520		521		522		523		524		525		526		527		528															
29	531		532		533		534		535		536		537		538		539		540		541		542		543		544		545		546		547		548															
30	551		552		553		554		555		556		557		558		559		560		561		562		563		564		565		566		567		568															
31	571		572		573		574		575		576		577		578		579		580		581		582		583		584		585		586		587		588															
32	591		592		593		594		595		596		597		598		599		600		601		602		603		604		605		606		607		608															
33	611		612		613		614		615		616		617		618		619		620		621		622		623		624		625		626		627		628															
34	631		632		633		634		635		636		637		638		639		640		641		642		643		644		645		646		647		648															
35	651		652		653		654		655		656		657		658		659		660		661		662		663		664		665		666		667		668															
36	671		672		673		674		675		676		677		678		679		680		681		682		683		684		685		686		687		688															
37	691		692		693		694		695		696		697		698		699		700		701		702		703		704		705		706		707		708															
38	711		712		713		714		715		716		717		718		719		720		721		722		723		724		725		726		727		728															
39	731		732		733		734		735		736		737		738		739		740		741		742		743		744		745		746		747		748															
40	751		752		753		754		755		756		757		758		759		760		761		762		763		764		765		766		767		768															
41	771		772		773		774		775		776		777		778		779		780		781		782		783		784		785		786		787		788															
42	791		792		793		794		795		796		797		798		799		800		801		802		803		804		805		806		807		808															
43	811		812		813		814		815		816		817		818		819		820		821		822		823		824		825		826		827		828															
44	831		832		833		834		835		836		837		838		839		840		841		842		843		844		845		846		847		848															
45	851		852		853		854		855		856		857		858		859		860		861		862		863		864		865		866		867		868															
46	871		872		873		874		875		876		877		878		879		880		881		882		883		884		885		886		887		888															
47	891		892		893		894		895		896		897		898		899		900		901		902		903		904		905		906		907		908															
48	911		912		913		914		915		916		917		918		919		920		921		922		923		924		925		926		927		928															
49	931		932		933		934		935		936		937		938		939		940		941		942		943		944		945		946		947		948															
50	951		952		953		954		955		956		957		958		959		960		961		962		963		964		965		966		967		968															
51	971		972		973		974		975		976		977		978		979		980		981		982		983		984		985		986		987		988															
52	991		992		993		994		995		996		997		998		999		1000		1001		1002		1003		1004		1005		1006		1007		1008															
53	1011		1012		1013		1014		1015		1016		1017		1018		1019		1020		1021		1022		1023		1024		1025		1026		1027		1028															
54	1031		1032		1033		1034		1035		1036		1037		1038		1039		1040		1041		1042		1043		1044		1045		1046		1047		1048															
55	1051		1052		1053		1054		1055		1056		1057		1058		1059		1060		1061		1062		1063		1064		1065		1066		1067		1068															
56	1071		1072		1073		1074		1075		1076		1077		1078		1079		1080		1081		1082		1083		1084		1085		1086		1087		1088															
57	1091		1092		1093		1094		1095		1096		1097		1098		1099		1100		1101		1102		1103		1104		1105		1106		1107		1108															
58	1111		1112		1113		1114		1115		1116		1117		1118		1119		1120		1121		1122		1123		1124		1125		1126		1127		1128															
59	1131		1132		1133		1134		1135		1136		1137		1138		1139		1140		1141		1142		1143		1144		1145		1146		1147		1148															
60	1151		1152		1153		1154		1155		1156		1157																																					

[†]Based upon ^{12}C . () indicates the mass number of the longest-lived isotope.

*IUPAC conventional atomic weights; standard atomic weights for these elements are expressed in intervals; see iupac.org for an explanation and values.

For a description of the data, visit physics.nist.gov/data

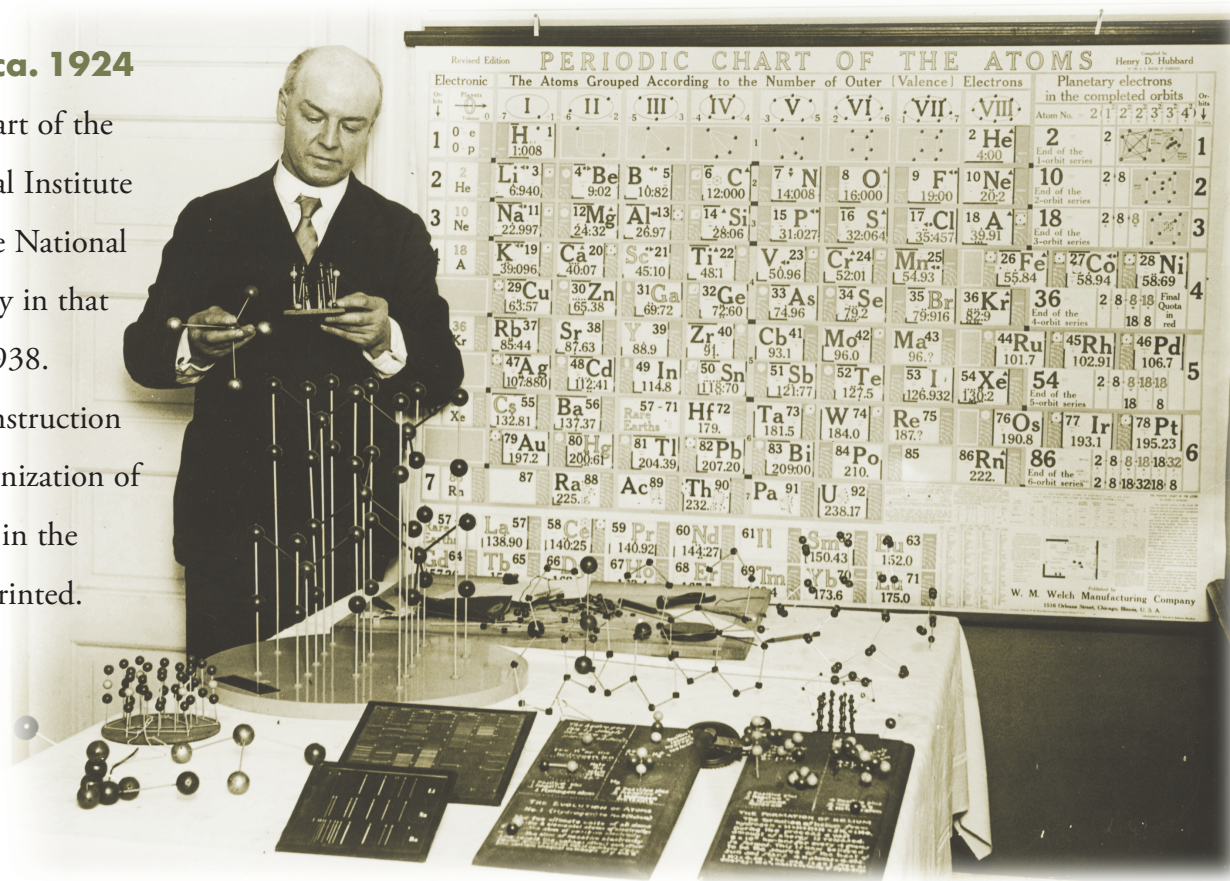
NIST SP 966 (March 2013)

National Institute of Standards and Technology Serving the Nation Since 1901

The Hubbard Chart of the Atoms, ca. 1924

Henry D. Hubbard, the designer of the “Chart of the Atoms,” was the first secretary of the National Institute of Standards and Technology (then-called the National Bureau of Standards) and served continuously in that capacity from 1901 until his retirement in 1938.

Secretary Hubbard made a contribution to instruction in physics that is still in use today, his modernization of Mendeleev’s periodic table. First constructed in the 1920s, it has been frequently revised and reprinted.



NIST
National Institute of
Standards and Technology
U.S. Department of Commerce
www.nist.gov

PML
Physical Measurement
Laboratory
www.nist.gov/pml

Standard
Reference
Data
www.nist.gov/srd