

# Periodic Table of the Elements

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18

1 <b>H</b> 1.008																	2 <b>He</b> 4.003																																																																																																																																																																																																																																																																																																																																																																																																														
3 <b>Li</b> 6.941																	9 <b>F</b> 19.00																																																																																																																																																																																																																																																																																																																																																																																																														
4 <b>Be</b> 9.012																	10 <b>Ne</b> 20.18																																																																																																																																																																																																																																																																																																																																																																																																														
11 <b>Na</b> 22.99																	17 <b>Cl</b> 35.45																																																																																																																																																																																																																																																																																																																																																																																																														
12 <b>Mg</b> 24.31																	18 <b>Ar</b> 39.95																																																																																																																																																																																																																																																																																																																																																																																																														
13 <b>B</b> 10.81	14 <b>C</b> 12.01	15 <b>N</b> 14.01	16 <b>O</b> 16.00	17 <b>F</b> 19.00	18 <b>Ne</b> 20.18	19 <b>K</b> 39.10	20 <b>Ca</b> 40.08	21 <b>Sc</b> 44.96	22 <b>Ti</b> 47.88	23 <b>V</b> 50.94	24 <b>Cr</b> 52.00	25 <b>Mn</b> 54.94	26 <b>Fe</b> 55.85	27 <b>Co</b> 58.93	28 <b>Ni</b> 58.69	29 <b>Cu</b> 63.55	30 <b>Zn</b> 65.39	31 <b>Ga</b> 69.72	32 <b>Ge</b> 72.61	33 <b>As</b> 74.92	34 <b>Se</b> 78.96	35 <b>Br</b> 79.90	36 <b>Kr</b> 83.80																																																																																																																																																																																																																																																																																																																																																																																																								
37 <b>Rb</b> 85.47	38 <b>Sr</b> 87.62	39 <b>Y</b> 88.91	40 <b>Zr</b> 91.22	41 <b>Nb</b> 92.91	42 <b>Mo</b> 95.94	43 <b>Tc</b> (98)	44 <b>Ru</b> 101.1	45 <b>Rh</b> 102.9	46 <b>Pd</b> 106.4	47 <b>Ag</b> 107.9	48 <b>Cd</b> 112.4	49 <b>In</b> 114.8	50 <b>Sn</b> 118.7	51 <b>Sb</b> 121.8	52 <b>Te</b> 127.6	53 <b>I</b> 126.9	54 <b>Xe</b> 131.3	55 <b>Rb</b> 85.47	56 <b>Sr</b> 87.62	57 <b>La</b> 138.9	58 <b>Ce</b> 140.1	59 <b>Pr</b> 140.9	60 <b>Nd</b> 144.2	61 <b>Pm</b> (145)	62 <b>Sm</b> 150.4	63 <b>Eu</b> 152.0	64 <b>Gd</b> 157.3	65 <b>Tb</b> 158.9	66 <b>Dy</b> 162.5	67 <b>Ho</b> 164.9	68 <b>Er</b> 167.3	69 <b>Tm</b> 168.9	70 <b>Yb</b> 173.0	71 <b>Lu</b> 175.0																																																																																																																																																																																																																																																																																																																																																																																													
87 <b>Fr</b> (223)	88 <b>Ra</b> (226)	89 <b>Ac</b> (227)	90 <b>Th</b> 232.0	91 <b>Pa</b> 231.0	92 <b>U</b> 238.0	93 <b>Np</b> (237)	94 <b>Pu</b> (244)	95 <b>Am</b> (243)	96 <b>Cm</b> (247)	97 <b>Bk</b> (247)	98 <b>Cf</b> (251)	99 <b>Es</b> (252)	100 <b>Fm</b> (257)	101 <b>Md</b> (258)	102 <b>No</b> (259)	103 <b>Lr</b> (262)	104 <b>Rf</b> (261)	105 <b>Db</b> (262)	106 <b>Sg</b> (263)	107 <b>Bh</b> (262)	108 <b>Hs</b> (265)	109 <b>Mt</b> (266)	110 <b>Ds</b> (269)	111 <b>Rg</b> (272)	112 <b>Cn</b> (277)	113 <b>Nh</b> (285)	114 <b>Fl</b> (289)	115 <b>Mc</b> (298)	116 <b>Lv</b> (304)	117 <b>Ts</b> (315)	118 <b>Og</b> (316)	119 <b>Uu</b> (330)	120 <b>Uub</b> (331)	121 <b>Uut</b> (348)	122 <b>Uuq</b> (349)	123 <b>Uubk</b> (360)	124 <b>Uucl</b> (370)	125 <b>Uubm</b> (381)	126 <b>Uubn</b> (392)	127 <b>Uubv</b> (404)	128 <b>Uubw</b> (414)	129 <b>Uubx</b> (426)	130 <b>Uubz</b> (437)	131 <b>Uuac</b> (448)	132 <b>Uuad</b> (459)	133 <b>Uuak</b> (470)	134 <b>Uuaf</b> (481)	135 <b>Uuag</b> (492)	136 <b>Uuah</b> (503)	137 <b>Uuai</b> (514)	138 <b>Uuaj</b> (525)	139 <b>Uuak</b> (536)	140 <b>Uual</b> (547)	141 <b>Uuam</b> (558)	142 <b>Uuan</b> (569)	143 <b>Uuao</b> (580)	144 <b>Uuap</b> (591)	145 <b>Uuaq</b> (602)	146 <b>Uuar</b> (613)	147 <b>Uuas</b> (624)	148 <b>Uuau</b> (635)	149 <b>Uuav</b> (646)	150 <b>Uuaw</b> (657)	151 <b>Uuax</b> (668)	152 <b>Uuay</b> (679)	153 <b>Uuaz</b> (690)	154 <b>Uuab</b> (701)	155 <b>Uuac</b> (712)	156 <b>Uuad</b> (723)	157 <b>Uuae</b> (734)	158 <b>Uuaf</b> (745)	159 <b>Uuag</b> (756)	160 <b>Uuah</b> (767)	161 <b>Uuai</b> (778)	162 <b>Uuaj</b> (789)	163 <b>Uuak</b> (800)	164 <b>Uual</b> (811)	165 <b>Uuam</b> (822)	166 <b>Uuan</b> (833)	167 <b>Uuao</b> (844)	168 <b>Uuap</b> (855)	169 <b>Uuaq</b> (866)	170 <b>Uuar</b> (877)	171 <b>Uuas</b> (888)	172 <b>Uuau</b> (899)	173 <b>Uuav</b> (910)	174 <b>Uuaw</b> (921)	175 <b>Uuax</b> (932)	176 <b>Uuay</b> (943)	177 <b>Uuaz</b> (954)	178 <b>Uuab</b> (965)	179 <b>Uuac</b> (976)	180 <b>Uuad</b> (987)	181 <b>Uuae</b> (998)	182 <b>Uuaf</b> (1009)	183 <b>Uuag</b> (1020)	184 <b>Uuah</b> (1031)	185 <b>Uuai</b> (1042)	186 <b>Uuaj</b> (1053)	187 <b>Uuak</b> (1064)	188 <b>Uual</b> (1075)	189 <b>Uuam</b> (1086)	190 <b>Uuan</b> (1097)	191 <b>Uuao</b> (1108)	192 <b>Uuap</b> (1119)	193 <b>Uuaq</b> (1130)	194 <b>Uuar</b> (1141)	195 <b>Uuas</b> (1152)	196 <b>Uuau</b> (1163)	197 <b>Uuav</b> (1174)	198 <b>Uuaw</b> (1185)	199 <b>Uuax</b> (1196)	200 <b>Uuay</b> (1207)	201 <b>Uuaz</b> (1218)	202 <b>Uuab</b> (1229)	203 <b>Uuac</b> (1240)	204 <b>Uuad</b> (1251)	205 <b>Uuae</b> (1262)	206 <b>Uuaf</b> (1273)	207 <b>Uuag</b> (1284)	208 <b>Uuah</b> (1295)	209 <b>Uuai</b> (1306)	210 <b>Uuaj</b> (1317)	211 <b>Uuak</b> (1328)	212 <b>Uual</b> (1339)	213 <b>Uuam</b> (1350)	214 <b>Uuan</b> (1361)	215 <b>Uuao</b> (1372)	216 <b>Uuap</b> (1383)	217 <b>Uuaq</b> (1394)	218 <b>Uuar</b> (1405)	219 <b>Uuas</b> (1416)	220 <b>Uuau</b> (1427)	221 <b>Uuav</b> (1438)	222 <b>Uuaw</b> (1449)	223 <b>Uuax</b> (1460)	224 <b>Uuay</b> (1471)	225 <b>Uuaz</b> (1482)	226 <b>Uuab</b> (1493)	227 <b>Uuac</b> (1504)	228 <b>Uuad</b> (1515)	229 <b>Uuae</b> (1526)	230 <b>Uuaf</b> (1537)	231 <b>Uuag</b> (1548)	232 <b>Uuah</b> (1559)	233 <b>Uuai</b> (1570)	234 <b>Uuaj</b> (1581)	235 <b>Uuak</b> (1592)	236 <b>Uual</b> (1603)	237 <b>Uuam</b> (1614)	238 <b>Uuan</b> (1625)	239 <b>Uuao</b> (1636)	240 <b>Uuap</b> (1647)	241 <b>Uuaq</b> (1658)	242 <b>Uuar</b> (1669)	243 <b>Uuas</b> (1680)	244 <b>Uuau</b> (1691)	245 <b>Uuav</b> (1702)	246 <b>Uuaw</b> (1713)	247 <b>Uuax</b> (1724)	248 <b>Uuay</b> (1735)	249 <b>Uuaz</b> (1746)	250 <b>Uuab</b> (1757)	251 <b>Uuac</b> (1768)	252 <b>Uuad</b> (1779)	253 <b>Uuae</b> (1790)	254 <b>Uuaf</b> (1801)	255 <b>Uuag</b> (1812)	256 <b>Uuah</b> (1823)	257 <b>Uuai</b> (1834)	258 <b>Uuaj</b> (1845)	259 <b>Uuak</b> (1856)	260 <b>Uual</b> (1867)	261 <b>Uuam</b> (1878)	262 <b>Uuan</b> (1889)	263 <b>Uuao</b> (1900)	264 <b>Uuap</b> (1911)	265 <b>Uuaq</b> (1922)	266 <b>Uuar</b> (1933)	267 <b>Uuas</b> (1944)	268 <b>Uuau</b> (1955)	269 <b>Uuav</b> (1966)	270 <b>Uuaw</b> (1977)	271 <b>Uuax</b> (1988)	272 <b>Uuay</b> (1999)	273 <b>Uuaz</b> (2010)	274 <b>Uuab</b> (2021)	275 <b>Uuac</b> (2032)	276 <b>Uuad</b> (2043)	277 <b>Uuae</b> (2054)	278 <b>Uuaf</b> (2065)	279 <b>Uuag</b> (2076)	280 <b>Uuah</b> (2087)	281 <b>Uuai</b> (2098)	282 <b>Uuaj</b> (2109)	283 <b>Uuak</b> (2120)	284 <b>Uual</b> (2131)	285 <b>Uuam</b> (2142)	286 <b>Uuan</b> (2153)	287 <b>Uuao</b> (2164)	288 <b>Uuap</b> (2175)	289 <b>Uuaq</b> (2186)	290 <b>Uuar</b> (2197)	291 <b>Uuas</b> (2208)	292 <b>Uuau</b> (2219)	293 <b>Uuav</b> (2230)	294 <b>Uuaw</b> (2241)	295 <b>Uuax</b> (2252)	296 <b>Uuay</b> (2263)	297 <b>Uuaz</b> (2274)	298 <b>Uuab</b> (2285)	299 <b>Uuac</b> (2296)	300 <b>Uuad</b> (2307)	301 <b>Uuae</b> (2318)	302 <b>Uuaf</b> (2329)	303 <b>Uuag</b> (2340)	304 <b>Uuah</b> (2351)	305 <b>Uuai</b> (2362)	306 <b>Uuaj</b> (2373)	307 <b>Uuak</b> (2384)	308 <b>Uual</b> (2395)	309 <b>Uuam</b> (2406)	310 <b>Uuan</b> (2417)	311 <b>Uuao</b> (2428)	312 <b>Uuap</b> (2439)	313 <b>Uuaq</b> (2450)	314 <b>Uuar</b> (2461)	315 <b>Uuas</b> (2472)	316 <b>Uuau</b> (2483)	317 <b>Uuav</b> (2494)	318 <b>Uuaw</b> (2505)	319 <b>Uuax</b> (2516)	320 <b>Uuay</b> (2527)	321 <b>Uuaz</b> (2538)	322 <b>Uuab</b> (2549)	323 <b>Uuac</b> (2560)	324 <b>Uuad</b> (2571)	325 <b>Uuae</b> (2582)	326 <b>Uuaf</b> (2593)	327 <b>Uuag</b> (2604)	328 <b>Uuah</b> (2615)	329 <b>Uuai</b> (2626)	330 <b>Uuaj</b> (2637)	331 <b>Uuak</b> (2648)	332 <b>Uual</b> (2659)	333 <b>Uuam</b> (2670)	334 <b>Uuan</b> (2681)	335 <b>Uuao</b> (2692)	336 <b>Uuap</b> (2703)	337 <b>Uuaq</b> (2714)	338 <b>Uuar</b> (2725)	339 <b>Uuas</b> (2736)	340 <b>Uuau</b> (2747)	341 <b>Uuav</b> (2758)	342 <b>Uuaw</b> (2769)	343 <b>Uuax</b> (2780)	344 <b>Uuay</b> (2791)	345 <b>Uuaz</b> (2802)	346 <b>Uuab</b> (2813)	347 <b>Uuac</b> (2824)	348 <b>Uuad</b> (2835)	349 <b>Uuae</b> (2846)	350 <b>Uuaf</b> (2857)	351 <b>Uuag</b> (2868)	352 <b>Uuah</b> (2879)	353 <b>Uuai</b> (2890)	354 <b>Uuaj</b> (2901)	355 <b>Uuak</b> (2912)	356 <b>Uual</b> (2923)	357 <b>Uuam</b> (2934)	358 <b>Uuan</b> (2945)	359 <b>Uuao</b> (2956)	360 <b>Uuap</b> (2967)	361 <b>Uuaq</b> (2978)	362 <b>Uuar</b> (2989)	363 <b>Uuas</b> (3000)	364 <b>Uuau</b> (3011)	365 <b>Uuav</b> (3022)	366 <b>Uuaw</b> (3033)	367 <b>Uuax</b> (3044)	368 <b>Uuay</b> (3055)	369 <b>Uuaz</b> (3066)	370 <b>Uuab</b> (3077)	371 <b>Uuac</b> (3088)	372 <b>Uuad</b> (3099)	373 <b>Uuae</b> (3110)	374 <b>Uuaf</b> (3121)	375 <b>Uuag</b> (3132)	376 <b>Uuah</b> (3143)	377 <b>Uuai</b> (3154)	378 <b>Uuaj</b> (3165)	379 <b>Uuak</b> (3176)	380 <b>Uual</b> (3187)	381 <b>Uuam</b> (3198)	382 <b>Uuan</b> (3209)	383 <b>Uuao</b> (3220)	384 <b>Uuap</b> (3231)	385 <b>Uuaq</b> (3242)	386 <b>Uuar</b> (3253)	387 <b>Uuas</b> (3264)	388 <b>Uuau</b> (3275)	389 <b>Uuav</b> (3286)	390 <b>Uuaw</b> (3297)	391 <b>Uuax</b> (3308)	392 <b>Uuay</b> (3319)	393 <b>Uuaz</b> (3330)	394 <b>Uuab</b> (3341)	395 <b>Uuac</b> (3352)	396 <b>Uuad</b> (3363)	397 <b>Uuae</b> (3374)	398 <b>Uuaf</b> (3385)	399 <b>Uuag</b> (3396)	400 <b>Uuah</b> (3407)	401 <b>Uuai</b> (3418)	402 <b>Uuaj</b> (3429)	403 <b>Uuak</b> (3440)	404 <b>Uual</b> (3451)	405 <b>Uuam</b> (3462)	406 <b>Uuan</b> (3473)	407 <b>Uuao</b> (3484)	408 <b>Uuap</b> (3495)	409 <b>Uuaq</b> (3506)	410 <b>Uuar</b> (3517)	411 <b>Uuas</b> (3528)	412 <b>Uuau</b> (3539)	413 <b>Uuav</b> (3550)	414 <b>Uuaw</b> (3561)	415 <b>Uuax</b> (3572)	416 <b>Uuay</b> (3583)	417 <b>Uuaz</b> (3594)	418 <b>Uuab</b> (3605)	419 <b>Uuac</b> (3616)	420 <b>Uuad</b> (3627)	421 <b>Uuae</b> (3638)	422 <b>Uuaf</b> (3649)	423 <b>Uuag</b> (3660)	424 <b>Uuah</b> (3671)	425 <b>Uuai</b> (3682)	426 <b>Uuaj</b> (3693)	427 <b>Uuak</b> (3704)	428 <b>Uual</b> (3715)	429 <b>Uuam</b> (3726)	430 <b>Uuan</b> (3737)	431 <b>Uuao</b> (3748)	432 <b>Uuap</b> (3759)	433 <b>Uuaq</b> (3770)	434 <b>Uuar</b> (3781)	435 <b>Uuas</b> (3792)	436 <b>Uuau</b> (3803)	437 <b>Uuav</b> (3814)	438 <b>Uuaw</b> (3825)	439 <b>Uuax</b> (3836)	440 <b>Uuay</b> (3847)	441 <b>Uuaz</b> (3858)	442 <b>Uuab</b> (3869)	443 <b>Uuac</b> (3880)	444 <b>Uuad</b> (3891)	445 <b>Uuae</b> (3902)	446 <b>Uuaf</b> (3913)	447 <b>Uuag</b> (3924)	448 <b>Uuah</b> (3935)	449 <b>Uuai</b> (3946)	450 <b>Uuaj</b> (3957)	451 <b>Uuak</b> (3968)	452 <b>Uual</b> (3979)	453 <b>Uuam</b> (3990)	454 <b>Uuan</b> (4001)	455 <b>Uuao</b> (4012)	456 <b>Uuap</b> (4023)	457 <b>Uuaq</b> (4034)	458 <b>Uuar</b> (4045)	459 <b>Uuas</b> (4056)	460 <b>Uuau</b> (4067)	461 <b>Uuav</b> (4078)	462 <b>Uuaw</b> (4089)	463 <b>Uuax</b> (4100)	464 <b>Uuay</b> (4111)	465 <b>Uuaz</b> (4122)	466 <b>Uuab</b> (4133)	467 <b>Uuac</b> (4144)	468 <b>Uuad</b> (4155)	469 <b>Uuae</b> (4166)	470 <b>Uuaf</b> (4177)	471 <b>Uuag</b> (4188)	472 <b>Uuah</b> (4199)	473 <b>Uuai</b> (4210)	474 <b>Uuaj</b> (4221)	475 <b>Uuak</b> (4232)	476 <b>Uual</b> (4243)	477 <b>Uuam</b> (4254)	478 <b>Uuan</b> (4265)	479 <b>Uuao</b> (4276)	480 <b>Uuap</b> (4287)	481 <b>Uuaq</b> (4298)	482 <b>Uuar</b> (4309)	483 <b>Uuas</b> (4320)	484 <b>Uuau</b> (4331)	485 <b>Uuav</b> (4342)	486 <b>Uuaw</b> (4353)	487 <b>Uuax</b> (4364)	488 <b>Uuay</b> (4375)	489 <b>Uuaz</b> (4386)	490 <b>Uuab</b> (4397)	491 <b>Uuac</b> (4408)	492 <b>Uuad</b> (4419)	493 <b>Uuae</b> (4430)	494 <b>Uuaf</b> (4441)	495 <b>Uuag</b> (4452)	496 <b>Uuah</b> (4463)	497 <b>Uuai</b> (4474)	498 <b>Uuaj</b> (4485)	499 <b>Uuak</b> (4496)	500 <b>Uual</b> (4507)	501 <b>Uuam</b> (4518)	502 <b>Uuan</b> (4529)

### Solubilities of Compounds at 25°C and 1 atm.

<b>Key</b> S = soluble I = insoluble sS = slightly soluble d = decomposes in water	acetate	bromide	carbonate	chloride	chromate	hydroxide	nitrate	oxide	phosphate	sulfate	sulfide
calcium	S	S	I	S	S	S	S	sS	I	sS	I
copper(II)	S	S	I	S	I	I	S	I	I	S	I
lead(II)	S	S	I	I	I	I	S	I	I	I	I
lithium	S	S	sS	S	S	S	S	S	sS	S	S
magnesium	S	S	I	S	S	I	S	I	I	S	d
potassium	S	S	S	S	S	S	S	S	S	S	S
silver	sS	I	I	I	I	–	S	I	I	sS	I
sodium	S	S	S	S	S	S	S	S	S	S	S

#### Important Formulas, Equations, and Constants

$$d = \frac{m}{V}$$

$$R = 8.314 \frac{L \cdot kPa}{mol \cdot K}$$

$$q = mC\Delta T$$

$$R = 0.0821 \frac{L \cdot atm}{mol \cdot K}$$

$$M_a V_a = M_b V_b$$

$$PV = nRT$$

$$0^\circ C = 273 K$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$pH = -\log[H_3O^+]$$

#### Common Polyatomic Ions

$NH_4^+$	ammonium
$NO_3^-$	nitrate
$SO_4^{2-}$	sulfate
$OH^-$	hydroxide
$PO_4^{3-}$	phosphate
$CO_3^{2-}$	carbonate
$CrO_4^{2-}$	chromate
$C_2H_3O_2^-$	acetate
$SCN^-$	thiocyanate

#### Activity Series

<b>Most</b>	Ba
	Ca
	Na
	Mg
	Zn
	Fe
	Pb
	H
<b>Least</b>	Cu