Empirical Data [lam16]

Atomic polarizabilities

$\alpha/(4\pi\epsilon_0)$ in units of 10^{-30} m^3			
H	0.667	He	0.205
Li	24.3	Ne	0.396
Na	23.6	Ar	1.64
K	43.4	Kr	2.48
Rb	47.3	Xe	4.04
Cs	59.6		

[from Pollack and Stump 2002]

Dielectric properties of insulators

Material	Dielectric constant κ	Dielectric strength E_{max} in 10^6 V/m
air	1.00059	3
polystyrene	2.5	20
Lucite	2.8	20
Plexiglas	3.4	40
Teflon	2.1	60
Mylar	3.1	
paper	3.7	16
fused quartz	3.8 to 4.1	
Pyrex	4 to 6	14
water	80	
strontium titanate	332	8

[from Pollack and Stump 2002]

Resistivity of some conducting materials:

Material	Resistivity ρ (Ω m)
pure metals[a] (0° C)	
Ag	1.47×10^{-8}
Cu	1.54×10^{-8}
Al	2.43×10^{-8}
Be	2.71×10^{-8}
W	4.82×10^{-8}
Zn	5.59×10^{-8}
Fe	8.64×10^{-8}
Pt	9.8×10^{-8}
Cs	18.0×10^{-8}
Pb	19.2×10^{-8}
Ti	45×10^{-8}
Hg[b] (liq., 20° C)	95.8×10^{-8}
Bi	127×10^{-8}
α-Mn	137×10^{-8}
sea water	0.21
semiconductors (20°C)	
Ge	~ 0.5
Si	~ 2300
insulators	
wood	10^8 to 10^{11}
glass	10^{10} to 10^{15}

[a] J. Bass, Landolt-Börnstein Volume 15. *Metals: Electronic Transport Phenomena* (Springer-Verlag, Berlin, 1982).

[b] *American Institute of Physics Handbook*, 2nd ed. (McGraw-Hill, New York, 1963).

[from Pollack and Stump 2002]

Magnetic susceptibilities of some elements and compounds:

Diamagnetic elements	$\chi_m{}^a$
H_2 (STP)	-2.2×10^{-9}
He (STP)	-1.1×10^{-9}
N_2 (STP)	-6.7×10^{-9}
Si	-3.3×10^{-6}
Ar (STP)	-1.1×10^{-8}
Cu	-9.6×10^{-6}
Xe (STP)	-2.6×10^{-8}
Au	-3.4×10^{-5}
Pb	-1.6×10^{-5}
Paramagnetic elements	χ_m
O_2 (STP)	$+1.9 \times 10^{-6}$
Na	$+8.5 \times 10^{-6}$
Al	$+2.1 \times 10^{-5}$
K	$+5.7 \times 10^{-6}$
Cr	$+2.9 \times 10^{-4}$
Rb	$+3.7 \times 10^{-6}$
W	$+7.0 \times 10^{-5}$
Nd	$+2.8 \times 10^{-4}$
Gd	$+8.7 \times 10^{-3}$
Compounds	χ_m
$H_2O(\ell, 293\,K)$	-9.0×10^{-6}
CO (STP)	-5.5×10^{-9}
NO (STP)	$+8.2 \times 10^{-7}$
CO_2 (STP)	-1.2×10^{-8}
SiO_2	-1.4×10^{-5}

[from Pollack and Stump 2002]

Spectrum of electromagnetic waves:

Frequency (Hz)	Description	Wavelength
10^2	super low frequency (SLF) radio waves submarine communication	3000 km
10^3	ultra low frequency (ULF) radio waves	300 km
10^4	very low frequency (VLF) radio waves	30 km
10^5	low frequency (LF) radio waves marine radio	3 km
10^6	medium frequency (MF) radio waves AM radio is 0.53×10^6 to 1.60×10^6 Hz.	300 m
10^7	high frequency (HF) short-wave radio	30 m
10^8	(VHF) aircraft radio and navigation FM radio is 0.87×10^8 to 1.08×10^8 Hz. TV channels 2–13	3 m
10^9	(UHF) cellular telephones, radar, microwave ovens, TV channels 14–83	30 cm
10^{10}	(SHF) microwaves, radar, mobile radio	3 cm
10^{11}	extremely high frequency (EHF) Cosmic microwave background maximum is at 3×10^{11} Hz.	3 mm
10^{12}	far infrared	0.3 mm
10^{13}	far infrared	30 μm
10^{14}	near infrared Visible light is 3.9×10^{14} to 7.6×10^{14} Hz.	3 μm
10^{15}	near ultraviolet	0.3 μm
10^{16}	vacuum ultraviolet	30 nm
10^{17}	soft X rays	3 nm
10^{18}	soft X rays	0.3 nm
10^{19}	hard X rays	30 pm
10^{20}	gamma rays	3 pm
10^{21}	gamma rays	0.3 pm
10^{22}	cosmic gamma rays	30 fm

[from Pollack and Stump 2002]

Periodic table:

IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA	VIIIA	VIIIA	IB	IIB	IIIB	IVB	VB	VIB	VIIB	VIII
1 **H** Hydrogen 1.00794 1s																	2 **He** Helium 4.00260 $1s^2$
3 **Li** Lithium 6.941 $1s^2 2s$	4 **Be** Beryllium 9.01218 $1s^2 2s^2$											5 **B** Boron 10.811 $1s^2 2s^2 2p$	6 **C** Carbon 12.0107 $1s^2 2s^2 2p^2$	7 **N** Nitrogen 14.00674 $1s^2 2s^2 2p^3$	8 **O** Oxygen 15.9994 $1s^2 2s^2 2p^4$	9 **F** Fluorine 18.99840 $1s^2 2s^2 2p^5$	10 **Ne** Neon 20.1797 $1s^2 2s^2 2p^6$
11 **Na** Sodium 22.98977 [Ne]3s	12 **Mg** Magnesium 24.3050 [Ne]$3s^2$											13 **Al** Aluminium 26.98154 [Ne]$3s^2 3p$	14 **Si** Silicon 28.0855 [Ne]$3s^2 3p^2$	15 **P** Phosphorous 30.97376 [Ne]$3s^2 3p^3$	16 **S** Sulphur 32.066 [Ne]$3s^2 3p^4$	17 **Cl** Chlorine 35.4527 [Ne]$3s^2 3p^5$	18 **Ar** Argon 39.948 [Ne]$3s^2 3p^6$
19 **K** Potassium 39.0983 [Ar]4s	20 **Ca** Calcium 40.078 [Ar]$4s^2$	21 **Sc** Scandium 44.95591 [Ar]$3d4s^2$	22 **Ti** Titanium 47.867 [Ar]$3d^2 4s^2$	23 **V** Vanadium 50.9415 [Ar]$3d^3 4s^2$	24 **Cr** Chromium 51.9961 [Ar]$3d^5 4s$	25 **Mn** Manganese 54.93805 [Ar]$3d^5 4s^2$	26 **Fe** Iron 55.845 [Ar]$3d^6 4s^2$	27 **Co** Cobalt 58.93320 [Ar]$3d^7 4s^2$	28 **Ni** Nickel 58.6934 [Ar]$3d^8 4s^2$	29 **Cu** Copper 63.546 [Ar]$3d^{10} 4s$	30 **Zn** Zinc 65.39 [Ar]$3d^{10} 4s^2$	31 **Ga** Gallium 69.723 [Ar]$3d^{10} 4s^2 4p$	32 **Ge** Germanium 72.61 [Ar]$3d^{10} 4s^2 4p^2$	33 **As** Arsenic 74.92160 [Ar]$3d^{10} 4s^2 4p^3$	34 **Se** Selenium 78.06 [Ar]$3d^{10} 4s^2 4p^4$	35 **Br** Bromine 79.904 [Ar]$3d^{10} 4s^2 4p^5$	36 **Kr** Krypton 83.80 [Ar]$3d^{10} 4s^2 4p^6$
37 **Rb** Rubidium 85.4678 [Kr]5s	38 **Sr** Strontium 87.62 [Kr]$5s^2$	39 **Y** Yttrium 88.90585 [Kr]$4d5s^2$	40 **Zr** Zirconium 91.224 [Kr]$4d^2 5s^2$	41 **Nb** Niobium 92.90638 [Kr]$4d^4 5s$	42 **Mo** Molybdenum 95.94 [Kr]$4d^5 5s$	43 **Tc** Technetium (98) [Kr]$4d^5 5s^2$	44 **Ru** Ruthenium 101.07 [Kr]$4d^7 5s$	45 **Rh** Rhodium 102.90550 [Kr]$4d^8 5s$	46 **Pd** Palladium 106.42 [Kr]$4d^{10}$	47 **Ag** Silver 107.8682 [Kr]$4d^{10} 5s$	48 **Cd** Cadmium 112.411 [Kr]$4d^{10} 5s^2$	49 **In** Indium 114.818 [Kr]$4d^{10} 5s^2 5p$	50 **Sn** Tin 118.710 [Kr]$4d^{10} 5s^2 5p^2$	51 **Sb** Antimony 121.760 [Kr]$4d^{10} 5s^2 5p^3$	52 **Te** Tellurium 127.60 [Kr]$4d^{10} 5s^2 5p^4$	53 **I** Iodine 126.90447 [Kr]$4d^{10} 5s^2 5p^5$	54 **Xe** Xenon 131.29 [Kr]$4d^{10} 5s^2 5p^6$
55 **Cs** Cesium 132.90545 [Xe]6s	56 **Ba** Barium 137.327 [Xe]$6s^2$	*	72 **Hf** Hafnium 178.49 [Xe]$4f^{14} 5d^2 6s^2$	73 **Ta** Tantalum 180.9479 [Xe]$4f^{14} 5d^3 6s^2$	74 **W** Tungsten 183.84 [Xe]$4f^{14} 5d^4 6s^2$	75 **Re** Rhenium 186.207 [Xe]$4f^{14} 5d^5 6s^2$	76 **Os** Osmium 190.23 [Xe]$4f^{14} 5d^6 6s^2$	77 **Ir** Iridium 192.217 [Xe]$4f^{14} 5d^7 6s^2$	78 **Pt** Platinum 195.078 [Xe]$4f^{14} 5d^9 6s$	79 **Au** Gold 196.96655 [Xe]$4f^{14} 5d^{10} 6s$	80 **Hg** Mercury 200.59 [Xe]$4f^{14} 5d^{10} 6s^2$	81 **Tl** Thallium 204.833 [Hg]6p	82 **Pb** Lead 207.2 [Hg]$6p^2$	83 **Bi** Bismuth 208.98038 [Hg]$6p^3$	84 **Po** Polonium (209) [Hg]$6p^4$	85 **At** Astatine (210) [Hg]$6p^5$	86 **Rn** Radon (222) [Hg]$6p^6$
87 **Fr** Francium (223) [Rn]7s	88 **Ra** Radium (226) [Rn]$7s^2$	†	104 **Rf** Rutherfordium (261) [Rn]$5f^{14} 6d^2 7s^2$?	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (263)	107 **Bh** Bohrium (264)	108 **Hs** Hassium (265)	109 **Mt** Meitnerium (268)									

Key: Atomic number → 5 **B**; Name → Boron; Atomic weight → 10.811; Electronic structure → $1s^2 2s^2 2p$

For atomic weight, a number in brackets indicates the mass number of the most stable isotope.

Lanthanides *	57 **La** Lanthanum 138.9055 [Xe]$5d6s^2$	58 **Ce** Cerium 140.116 [Xe]$4f5d6s^2$	59 **Pr** Praseodymium 140.90765 [Xe]$4f^3 6s^2$	60 **Nd** Neodymium 144.24 [Xe]$4f^4 6s^2$	61 **Pm** Promethium (145) [Xe]$4f^5 6s^2$	62 **Sm** Samarium 150.36 [Xe]$4f^6 6s^2$	63 **Eu** Europium 151.964 [Xe]$4f^7 6s^2$	64 **Gd** Gadolinium 157.25 [Xe]$4f^7 5d6s^2$	65 **Tb** Terbium 158.92534 [Xe]$4f^9 6s^2$	66 **Dy** Dysprosium 162.50 [Xe]$4f^{10} 6s^2$	67 **Ho** Holmium 164.93032 [Xe]$4f^{11} 6s^2$	68 **Er** Erbium 167.26 [Xe]$4f^{12} 6s^2$	69 **Tm** Thulium 168.93421 [Xe]$4f^{13} 6s^2$	70 **Yb** Ytterbium 173.04 [Xe]$4f^{14} 6s^2$	71 **Lu** Lutetium 174.967 [Xe]$4f^{14} 5d6s^2$
Actinides †	89 **Ac** Actinium (227) [Rn]$6d7s^2$	90 **Th** Thorium 232.0381 [Rn]$6d^2 7s^2$	91 **Pa** Protactinium 231.03588 [Rn]$5f^2 6d7s^2$	92 **U** Uranium 238.0289 [Rn]$5f^3 6d7s^2$	93 **Np** Neptunium (237) [Rn]$5f^4 6d7s^2$	94 **Pu** Plutonium (244) [Rn]$5f^6 7s^2$	95 **Am** Americium (243) [Rn]$5f^7 7s^2$	96 **Cm** Curium (247) [Rn]$5f^7 6d7s^2$	97 **Bk** Berkelium (247) [Rn]$5f^9 7s^2$	98 **Cf** Californium (251) [Rn]$5f^{10} 7s^2$	99 **Es** Einsteinium (252) [Rn]$5f^{11} 7s^2$	100 **Fm** Fermium (257) [Rn]$5f^{12} 7s^2$	101 **Md** Mendelevium (258) [Rn]$5f^{13} 7s^2$	102 **No** Nobelium (259) [Rn]$5f^{14} 7s^2$	103 **Lr** Lawrencium (262) [Rn]$5f^{14} 7s^2 7p$?

[from Blundell 2011]