

# Electronegativities of the elements (data page)

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## Electronegativity (Pauling scale)

| Periodic table of electronegativity by Pauling scale                                    |                                    |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |                                    |            |
|---|------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------------------------------|------------|
| → Atomic radius decreases → Ionization energy increases → Electronegativity increases → |                                    |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |                                    |            |
|   | 1                                  | 2          | 3          | 4          | 5          | 6          | 7          | 8          | 9          | 10         | 11         | 12         | 13         | 14         | 15         | 16         | 17                                 | 18         |
| Group →   |                                    |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |                                    |            |
| ↓ Period  |                                    |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |                                    |            |
| 1   | H<br>2.20                          |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |                                    | He         |
| 2   | Li<br>0.98                         | Be<br>1.57 |            |            |            |            |            |            |            |            |            |            | B<br>2.04  | C<br>2.55  | N<br>3.04  | O<br>3.44  | F<br>3.98                          | Ne         |
| 3   | Na<br>0.93                         | Mg<br>1.31 |            |            |            |            |            |            |            |            |            |            | Al<br>1.61 | Si<br>1.90 | P<br>2.19  | S<br>2.58  | Cl<br>3.16                         | Ar         |
| 4   | K<br>0.82                          | Ca<br>1.00 | Sc<br>1.36 | Ti<br>1.54 | V<br>1.63  | Cr<br>1.66 | Mn<br>1.55 | Fe<br>1.83 | Co<br>1.88 | Ni<br>1.91 | Cu<br>1.90 | Zn<br>1.65 | Ga<br>1.81 | Ge<br>2.01 | As<br>2.18 | Se<br>2.55 | Br<br>2.96                         | Kr<br>3.00 |
| 5   | Rb<br>0.82                         | Sr<br>0.95 | Y<br>1.22  | Zr<br>1.33 | Nb<br>1.6  | Mo<br>2.16 | Tc<br>1.9  | Ru<br>2.2  | Rh<br>2.28 | Pd<br>2.20 | Ag<br>1.93 | Cd<br>1.69 | In<br>1.78 | Sn<br>1.96 | Sb<br>2.05 | Te<br>2.1  | I<br>2.66                          | Xe<br>2.60 |
| 6   | Cs<br>0.79                         | Ba<br>0.89 | *          | Hf<br>1.3  | Ta<br>1.5  | W<br>2.36  | Re<br>1.9  | Os<br>2.2  | Ir<br>2.20 | Pt<br>2.28 | Au<br>2.54 | Hg<br>2.00 | Tl<br>1.62 | Pb<br>1.87 | Bi<br>2.02 | Po<br>2.0  | At<br>2.2                          | Rn<br>2.2  |
| 7   | Fr<br>0.7<br><small>[en 1]</small> | Ra<br>0.9  | **         | Rf         | Db         | Sg         | Bh         | Hs         | Mt         | Ds         | Rg         | Cn         | Nh         | Fl         | Mc         | Lv         | Ts                                 | Og         |
|   |                                    | *          | La<br>1.1  | Ce<br>1.12 | Pr<br>1.13 | Nd<br>1.14 | Pm<br>1.13 | Sm<br>1.17 | Eu<br>1.2  | Gd<br>1.2  | Tb<br>1.1  | Dy<br>1.22 | Ho<br>1.23 | Er<br>1.24 | Tm<br>1.25 | Yb<br>1.1  | Lu<br>1.27                         |            |
|   |                                    | **         | Ac<br>1.1  | Th<br>1.3  | Pa<br>1.5  | U<br>1.38  | Np<br>1.36 | Pu<br>1.28 | Am<br>1.13 | Cm<br>1.28 | Bk<br>1.3  | Cf<br>1.3  | Es<br>1.3  | Fm<br>1.3  | Md<br>1.3  | No<br>1.3  | Lr<br>1.3<br><small>[en 2]</small> |            |

Values are given for the elements in their most common and stable oxidation states.

See also: **Electronegativities of the elements (data page)**

1. Electronegativity of francium was chosen by Pauling as 0.7, close to that of caesium (also assessed 0.7 at that point). The base value of hydrogen was later increased by 0.10 and caesium's electronegativity was later refined to 0.79; however, no refinements have been made for francium as no experiment has been conducted and the old value was kept. However, francium is expected and, to a small extent, observed to be less electropositive than caesium. See francium for details.
2. See Brown, Geoffrey (2012). *The Inaccessible Earth: An integrated view to its structure and composition*. Springer Science & Business Media. p. 88. ISBN 9789401115162.



| number | symbol | name       | use     | WEL  | CRC  | LNG  |
|--------|--------|------------|---------|------|------|------|
| 1      | H      | hydrogen   | 2.20    | same |      |      |
| 2      | He     | helium     | no data | same |      |      |
| 3      | Li     | lithium    | 0.98    | same |      |      |
| 4      | Be     | beryllium  | 1.57    | same |      |      |
| 5      | B      | boron      | 2.04    | same |      |      |
| 6      | C      | carbon     | 2.55    | same |      |      |
| 7      | N      | nitrogen   | 3.04    | same |      |      |
| 8      | O      | oxygen     | 3.44    | same |      |      |
| 9      | F      | fluorine   | 3.98    | 3.98 | 3.98 | 3.90 |
| 10     | Ne     | neon       | no data | same |      |      |
| 11     | Na     | sodium     | 0.93    | same |      |      |
| 12     | Mg     | magnesium  | 1.31    | same |      |      |
| 13     | Al     | aluminium  | 1.61    | same |      |      |
| 14     | Si     | silicon    | 1.90    | same |      |      |
| 15     | P      | phosphorus | 2.19    | same |      |      |
| 16     | S      | sulfur     | 2.58    | same |      |      |
| 17     | Cl     | chlorine   | 3.16    | same |      |      |
| 18     | Ar     | argon      | no data | same |      |      |
| 19     | K      | potassium  | 0.82    | same |      |      |
| 20     | Ca     | calcium    | 1.00    | same |      |      |
| 21     | Sc     | scandium   | 1.36    | same |      |      |
| 22     | Ti     | titanium   | 1.54    | same |      |      |
| 23     | V      | vanadium   | 1.63    | same |      |      |
| 24     | Cr     | chromium   | 1.66    | same |      |      |
| 25     | Mn     | manganese  | 1.55    | same |      |      |
| 26     | Fe     | iron       | 1.83    | same |      |      |
| 27     | Co     | cobalt     | 1.88    | same |      |      |
| 28     | Ni     | nickel     | 1.91    | same |      |      |
| 29     | Cu     | copper     | 1.90    | same |      |      |
| 30     | Zn     | zinc       | 1.65    | same |      |      |
| 31     | Ga     | gallium    | 1.81    | same |      |      |
| 32     | Ge     | germanium  | 2.01    | same |      |      |
| 33     | As     | arsenic    | 2.18    | same |      |      |
| 34     | Se     | selenium   | 2.55    | same |      |      |

| number | symbol | name         | use     | WEL  | CRC     | LNG     |
|--------|--------|--------------|---------|------|---------|---------|
| 35     | Br     | bromine      | 2.96    | same |         |         |
| 36     | Kr     | krypton      | 3.00    | 3.00 | no data | no data |
| 37     | Rb     | rubidium     | 0.82    | same |         |         |
| 38     | Sr     | strontium    | 0.95    | same |         |         |
| 39     | Y      | yttrium      | 1.22    | same |         |         |
| 40     | Zr     | zirconium    | 1.33    | same |         |         |
| 41     | Nb     | niobium      | 1.6     | same |         |         |
| 42     | Mo     | molybdenum   | 2.16    | same |         |         |
| 43     | Tc     | technetium   | 1.9     | 1.9  | 2.10    | 2.10    |
| 44     | Ru     | ruthenium    | 2.2     | same |         |         |
| 45     | Rh     | rhodium      | 2.28    | same |         |         |
| 46     | Pd     | palladium    | 2.20    | same |         |         |
| 47     | Ag     | silver       | 1.93    | same |         |         |
| 48     | Cd     | cadmium      | 1.69    | same |         |         |
| 49     | In     | indium       | 1.78    | same |         |         |
| 50     | Sn     | tin          | 1.96    | same |         |         |
| 51     | Sb     | antimony     | 2.05    | same |         |         |
| 52     | Te     | tellurium    | 2.1     | same |         |         |
| 53     | I      | iodine       | 2.66    | same |         |         |
| 54     | Xe     | xenon        | 2.6     | 2.6  | 2.60    | no data |
| 55     | Cs     | caesium      | 0.79    | same |         |         |
| 56     | Ba     | barium       | 0.89    | same |         |         |
| 57     | La     | lanthanum    | 1.10    | same |         |         |
| 58     | Ce     | cerium       | 1.12    | same |         |         |
| 59     | Pr     | praseodymium | 1.13    | same |         |         |
| 60     | Nd     | neodymium    | 1.14    | same |         |         |
| 61     | Pm     | promethium   | no data | same |         |         |
| 62     | Sm     | samarium     | 1.17    | same |         |         |
| 63     | Eu     | europium     | no data | same |         |         |
| 64     | Gd     | gadolinium   | 1.20    | same |         |         |
| 65     | Tb     | terbium      | no data | same |         |         |
| 66     | Dy     | dysprosium   | 1.22    | same |         |         |
| 67     | Ho     | holmium      | 1.23    | same |         |         |
|        |        |              |         |      |         |         |

| number | symbol | name         | use     | WEL  | CRC     | LNG |
|--------|--------|--------------|---------|------|---------|-----|
| 68     | Er     | erbium       | 1.24    | same |         |     |
| 69     | Tm     | thulium      | 1.25    | same |         |     |
| 70     | Yb     | ytterbium    | no data | same |         |     |
| 71     | Lu     | lutetium     | 1.27    | 1.27 | 1.0     | 1.0 |
| 72     | Hf     | hafnium      | 1.3     | same |         |     |
| 73     | Ta     | tantalum     | 1.5     | same |         |     |
| 74     | W      | tungsten     | 2.36    | 2.36 | 1.7     | 1.7 |
| 75     | Re     | rhenium      | 1.9     | same |         |     |
| 76     | Os     | osmium       | 2.2     | same |         |     |
| 77     | Ir     | iridium      | 2.20    | 2.20 | 2.2     | 2.2 |
| 78     | Pt     | platinum     | 2.28    | 2.28 | 2.2     | 2.2 |
| 79     | Au     | gold         | 2.54    | 2.54 | 2.4     | 2.4 |
| 80     | Hg     | mercury      | 2.00    | 2.00 | 1.9     | 1.9 |
| 81     | Tl     | thallium     | 1.62    | 1.62 | 1.8     | 1.8 |
| 82     | Pb     | lead         | 2.33    | 2.33 | 1.8     | 1.8 |
| 83     | Bi     | bismuth      | 2.02    | 2.02 | 1.9     | 1.9 |
| 84     | Po     | polonium     | 2.0     | same |         |     |
| 85     | At     | astatine     | 2.2     | same |         |     |
| 86     | Rn     | radon        | no data | same |         |     |
| 87     | Fr     | francium     | no data | 0.7  |         |     |
| 88     | Ra     | radium       | 0.9     | same |         |     |
| 89     | Ac     | actinium     | 1.1     | same |         |     |
| 90     | Th     | thorium      | 1.3     | same |         |     |
| 91     | Pa     | protactinium | 1.5     | same |         |     |
| 92     | U      | uranium      | 1.38    | 1.38 | 1.7     | 1.7 |
| 93     | Np     | neptunium    | 1.36    | 1.36 | 1.3     | 1.3 |
| 94     | Pu     | plutonium    | 1.28    | 1.28 | 1.3     | 1.3 |
| 95     | Am     | americium    | 1.3     | 1.3  | no data | 1.3 |
| 96     | Cm     | curium       | 1.3     | 1.3  | no data | 1.3 |
| 97     | Bk     | berkelium    | 1.3     | 1.3  | no data | 1.3 |
| 98     | Cf     | californium  | 1.3     | 1.3  | no data | 1.3 |
| 99     | Es     | einsteinium  | 1.3     | 1.3  | no data | 1.3 |
| 100    | Fm     | fermium      | 1.3     | 1.3  | no data | 1.3 |
| 101    | Md     | mendelevium  | 1.3     | 1.3  | no data | 1.3 |

| number | symbol | name     | use | WEL | CRC     | LNG |
|--------|--------|----------|-----|-----|---------|-----|
| 102    | No     | nobelium | 1.3 | 1.3 | no data | 1.3 |

## Notes

- Separate values for each source are only given where one or more sources differ.
- Electronegativity is not a uniquely defined property and may depend on the definition. The suggested values are all taken from WebElements as a consistent set.
- Many of the highly radioactive elements have values that must be predictions or extrapolations, but are unfortunately not marked as such. This is especially problematic for francium, which by relativistic calculations can be shown to be less electronegative than caesium, but for which the only value (0.7) in the literature predates these calculations. To avoid confusion, therefore, no value has been shown for francium, though a value around 0.8 might be expected.

## Electronegativity (Allen scale)

| Electronegativity using the Allen scale |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Group →                                 | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    |
| ↓ Period                                |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 1                                       | H     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | He    |
|   | 2.300 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 4.160 |
| 2                                       | Li    | Be    |       |       |       |       |       |       |       |       |       |       | B     | C     | N     | O     | F     | Ne    |
|   | 0.912 | 1.576 |       |       |       |       |       |       |       |       |       |       | 2.051 | 2.544 | 3.066 | 3.610 | 4.193 | 4.789 |
| 3                                       | Na    | Mg    |       |       |       |       |       |       |       |       |       |       | Al    | Si    | P     | S     | Cl    | Ar    |
|   | 0.869 | 1.293 |       |       |       |       |       |       |       |       |       |       | 1.613 | 1.916 | 2.253 | 2.589 | 2.869 | 3.242 |
| 4                                       | K     | Ca    | Sc    | Ti    | V     | Cr    | Mn    | Fe    | Co    | Ni    | Cu    | Zn    | Ga    | Ge    | As    | Se    | Br    | Kr    |
|   | 0.734 | 1.034 | 1.191 | 1.381 | 1.531 | 1.651 | 1.751 | 1.801 | 1.841 | 1.881 | 1.851 | 1.591 | 1.756 | 1.994 | 2.211 | 2.434 | 2.685 | 2.966 |
| 5                                       | Rb    | Sr    | Y     | Zr    | Nb    | Mo    | Tc    | Ru    | Rh    | Pd    | Ag    | Cd    | In    | Sn    | Sb    | Te    | I     | Xe    |
|   | 0.706 | 0.963 | 1.121 | 1.321 | 1.411 | 1.471 | 1.511 | 1.541 | 1.561 | 1.591 | 1.871 | 1.521 | 1.656 | 1.824 | 1.984 | 2.158 | 2.359 | 2.582 |
| 6                                       | Cs    | Ba    | Lu    | Hf    | Ta    | W     | Re    | Os    | Ir    | Pt    | Au    | Hg    | Tl    | Pb    | Bi    | Po    | At    | Rn    |
|   | 0.659 | 0.881 | 1.091 | 1.161 | 1.341 | 1.471 | 1.601 | 1.651 | 1.681 | 1.721 | 1.921 | 1.761 | 1.789 | 1.854 | 2.01  | 2.19  | 2.39  | 2.60  |
| 7                                       | Fr    | Ra    |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|   | 0.67  | 0.89  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

See also: [Electronegativities of the elements \(data page\)](#)





| Number | Symbol | Name       | Electronegativity |
|--------|--------|------------|-------------------|
| 1      | H      | hydrogen   | 2.300             |
| 2      | He     | helium     | 4.160             |
| 3      | Li     | lithium    | 0.912             |
| 4      | Be     | beryllium  | 1.576             |
| 5      | B      | boron      | 2.051             |
| 6      | C      | carbon     | 2.544             |
| 7      | N      | nitrogen   | 3.066             |
| 8      | O      | oxygen     | 3.610             |
| 9      | F      | fluorine   | 4.193             |
| 10     | Ne     | neon       | 4.789             |
| 11     | Na     | sodium     | 0.869             |
| 12     | Mg     | magnesium  | 1.293             |
| 13     | Al     | aluminium  | 1.613             |
| 14     | Si     | silicon    | 1.916             |
| 15     | P      | phosphorus | 2.253             |
| 16     | S      | sulfur     | 2.589             |
| 17     | Cl     | chlorine   | 2.869             |
| 18     | Ar     | argon      | 3.242             |
| 19     | K      | potassium  | 0.734             |
| 20     | Ca     | calcium    | 1.034             |
| 21     | Sc     | scandium   | 1.19              |
| 22     | Ti     | titanium   | 1.38              |
| 23     | V      | vanadium   | 1.53              |
| 24     | Cr     | chromium   | 1.65              |
| 25     | Mn     | manganese  | 1.75              |
| 26     | Fe     | iron       | 1.80              |
| 27     | Co     | cobalt     | 1.84              |
| 28     | Ni     | nickel     | 1.88              |
| 29     | Cu     | copper     | 1.85              |
| 30     | Zn     | zinc       | 1.59              |
| 31     | Ga     | gallium    | 1.756             |
| 32     | Ge     | germanium  | 1.994             |
| 33     | As     | arsenic    | 2.211             |
| 34     | Se     | selenium   | 2.434             |

| Number | Symbol | Name       | Electronegativity |
|--------|--------|------------|-------------------|
| 35     | Br     | bromine    | 2.685             |
| 36     | Kr     | krypton    | 2.966             |
| 37     | Rb     | rubidium   | 0.706             |
| 38     | Sr     | strontium  | 0.963             |
| 39     | Y      | yttrium    | 1.12              |
| 40     | Zr     | zirconium  | 1.32              |
| 41     | Nb     | niobium    | 1.41              |
| 42     | Mo     | molybdenum | 1.47              |
| 43     | Tc     | technetium | 1.51              |
| 44     | Ru     | ruthenium  | 1.54              |
| 45     | Rh     | rhodium    | 1.56              |
| 46     | Pd     | palladium  | 1.59              |
| 47     | Ag     | silver     | 1.87              |
| 48     | Cd     | cadmium    | 1.52              |
| 49     | In     | indium     | 1.656             |
| 50     | Sn     | tin        | 1.824             |
| 51     | Sb     | antimony   | 1.984             |
| 52     | Te     | tellurium  | 2.158             |
| 53     | I      | iodine     | 2.359             |
| 54     | Xe     | xenon      | 2.582             |
| 55     | Cs     | caesium    | 0.659             |
| 56     | Ba     | barium     | 0.881             |
| 71     | Lu     | lutetium   | 1.09              |
| 72     | Hf     | hafnium    | 1.16              |
| 73     | Ta     | tantalum   | 1.34              |
| 74     | W      | tungsten   | 1.47              |
| 75     | Re     | rhenium    | 1.60              |
| 76     | Os     | osmium     | 1.65              |
| 77     | Ir     | iridium    | 1.68              |
| 78     | Pt     | platinum   | 1.72              |
| 79     | Au     | gold       | 1.92              |
| 80     | Hg     | mercury    | 1.76              |
| 81     | Tl     | thallium   | 1.789             |
|        |        |            |                   |

| Number | Symbol | Name     | Electronegativity |
|--------|--------|----------|-------------------|
| 82     | Pb     | lead     | 1.854             |
| 83     | Bi     | bismuth  | 2.01              |
| 84     | Po     | polonium | 2.19              |
| 85     | At     | astatine | 2.39              |
| 86     | Rn     | radon    | 2.60              |
| 87     | Fr     | francium | 0.67              |
| 88     | Ra     | radium   | 0.89              |

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