



# TRENDS IN THE MODERN PERIODIC TABLE

# GROUPS IN MODERN PERIODIC TABLE

The modern periodic table contains 18 vertical columns known as groups.

❖ Group 1 elements are known as alkali metals.

Group 2 elements are known as alkaline earth metals.

Group 15 elements are known as pnictogens.

Group 16 elements are known as chalcogens.

Group 17 elements are known as halogens.

Group 18 elements are known as noble gases.

# CLASSIFICATION OF MODERN PERIODIC TABLE

- ❖ The modern periodic table is also classified into metals, nonmetals and metalloids.
- ❖ Metals
  - ❖ Metals are electropositive as they form bonds by losing electrons.
  - ❖ In general cases, oxides of metals are basic in nature.
- ❖ Nonmetals
  - ❖ Nonmetals are electronegative as they form bonds by gaining electrons.
  - ❖ In general cases, oxides of non-metals are acidic in nature.
- ❖ Metalloids
  - ❖ The elements which show the properties of both metals and nonmetals are called metalloids or semimetals.
  - ❖ For example – Boron, silicon, germanium, arsenic, antimony, tellurium, and polonium.

# TRENDS IN MODERN PERIODIC TABLE

- ❖ In a group – Elements have the same number of valence electrons.
- ❖ Down the group – number of shells increases.
- ❖ In a period – Elements have the same number of shells.
- ❖ Along the period – valence shell electrons increase by one unit.

# VARIATION OF VALENCY

Valency of an element can be calculated from the electronic configuration in two ways –

Valency = number of valence electrons (if they are 1, 2, 3 or 4).

Valency = 8 – number of valence electrons (if they are 5, 6, 7 or 8).

All the elements of a group have the same number of valence electrons.

Therefore, they all have the same valency.

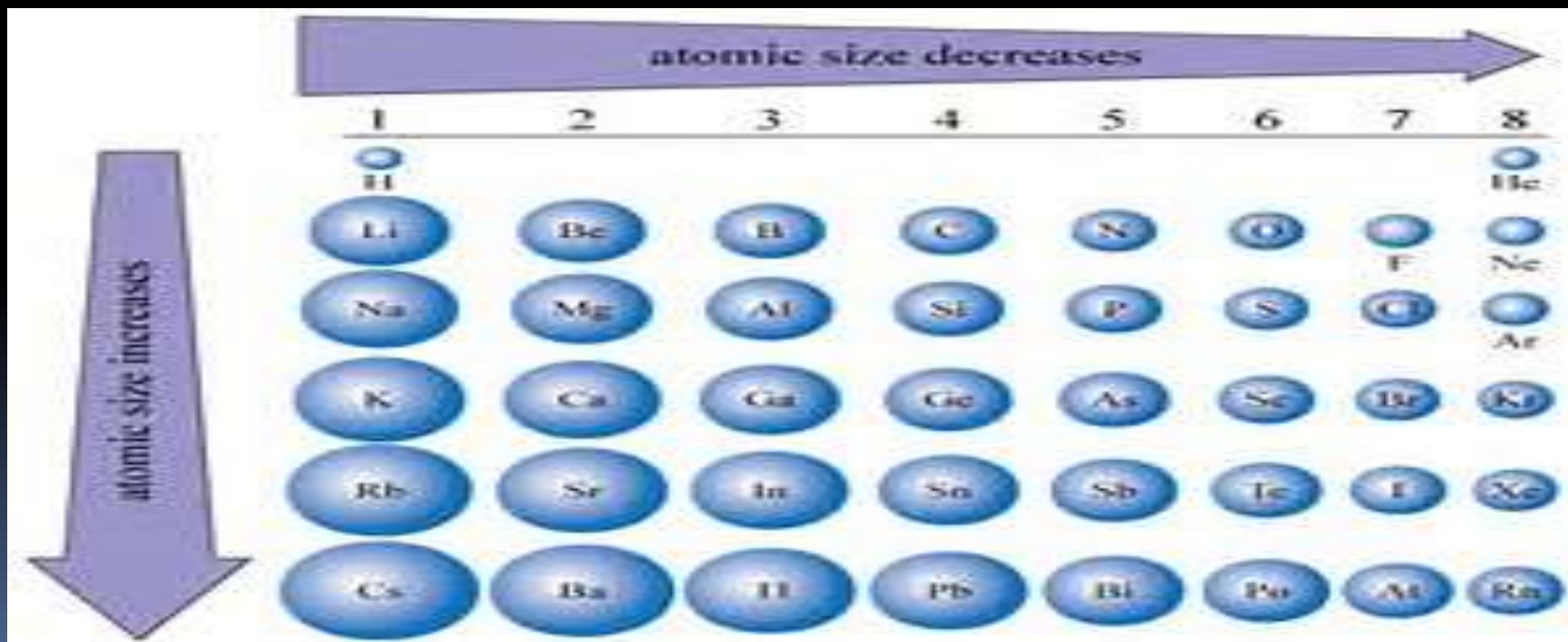
|         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|
| H<br>1  |         |         |         |         |         |         | He<br>0 |
| Li<br>1 | Be<br>2 | B<br>3  | C<br>4  | N<br>3  | O<br>2  | F<br>1  | Ne<br>0 |
| Na<br>1 | Mg<br>2 | Al<br>3 | Si<br>4 | P<br>3  | S<br>2  | Cl<br>1 | Ar<br>0 |
| K<br>1  | Ca<br>2 | Ga<br>3 | Ge<br>4 | As<br>3 | Se<br>2 | Br<br>1 | Kr<br>0 |

# VARIATION OF ATOMIC SIZE

Atomic size or radii: It is defined as the distance from the centre of the nucleus to the valence shell of the atom.

Along the period – Atomic radius decreases because effective nuclear charge increases by one unit and it pulls valence electrons or the electron cloud closer to the nucleus.

Down the group – Atomic radius increases because new shells are added, hence, the distance between the nucleus and valence electrons or the electron cloud increases.



# VARIATION OF METALLIC PROPERTIES

Along the period – Metallic character decreases because the tendency to lose valence electrons decreases due to increasing nuclear charge.

Down the group- As the distance between the nucleus and outermost electron increases, nuclear pull decreases. This increases the tendency of an atom to lose valence electron/s, hence metallic character increases.

INCREASING METALLIC CHARACTER

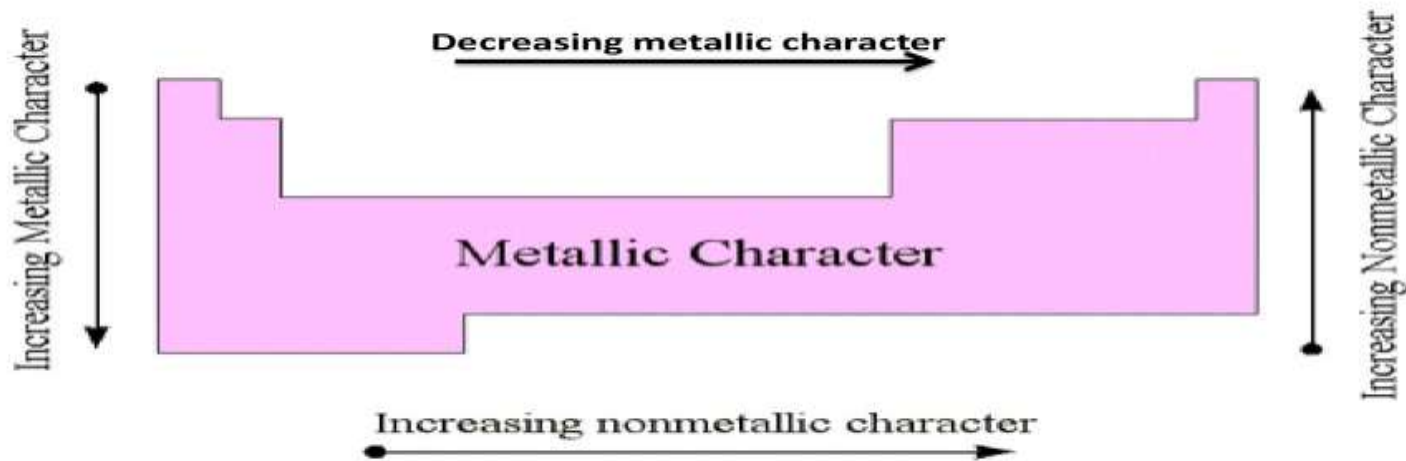
|                                        |                                         |                                          |                                       |                                         |                                        |                                           |                                     |                                        |                                        |                                      |                                      |                                         |                                       |                                         |                                      |                                          |                                       |                                           |                                       |                                         |                                            |                                        |                                         |                                       |                                        |                                         |                                           |                                         |                                        |                                         |                                           |                                           |                                          |                                           |                                          |
|----------------------------------------|-----------------------------------------|------------------------------------------|---------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------------------|-------------------------------------|----------------------------------------|----------------------------------------|--------------------------------------|--------------------------------------|-----------------------------------------|---------------------------------------|-----------------------------------------|--------------------------------------|------------------------------------------|---------------------------------------|-------------------------------------------|---------------------------------------|-----------------------------------------|--------------------------------------------|----------------------------------------|-----------------------------------------|---------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------------|-----------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------------|-------------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------|
| 1<br><b>H</b><br>Protogen<br>1.00794   |                                         |                                          |                                       |                                         |                                        |                                           |                                     |                                        |                                        |                                      |                                      |                                         |                                       |                                         |                                      |                                          | 2<br><b>He</b><br>Helium<br>4.003     |                                           |                                       |                                         |                                            |                                        |                                         |                                       |                                        |                                         |                                           |                                         |                                        |                                         |                                           |                                           |                                          |                                           |                                          |
| 3<br><b>Li</b><br>Lithium<br>6.941     | 4<br><b>Be</b><br>Beryllium<br>9.012182 |                                          |                                       |                                         |                                        |                                           |                                     |                                        |                                        |                                      |                                      |                                         |                                       |                                         |                                      | 5<br><b>B</b><br>Boron<br>10.811         | 6<br><b>C</b><br>Carbon<br>12.0107    | 7<br><b>N</b><br>Nitrogen<br>14.00674     | 8<br><b>O</b><br>Oxygen<br>15.9994    | 9<br><b>F</b><br>Fluorine<br>18.9984832 | 10<br><b>Ne</b><br>Neon<br>20.1797         |                                        |                                         |                                       |                                        |                                         |                                           |                                         |                                        |                                         |                                           |                                           |                                          |                                           |                                          |
| 11<br><b>Na</b><br>Sodium<br>22.989770 | 12<br><b>Mg</b><br>Magnesium<br>24.3050 |                                          |                                       |                                         |                                        |                                           |                                     |                                        |                                        |                                      |                                      |                                         |                                       |                                         |                                      | 13<br><b>Al</b><br>Aluminum<br>26.981538 | 14<br><b>Si</b><br>Silicon<br>28.0855 | 15<br><b>P</b><br>Phosphorus<br>30.973761 | 16<br><b>S</b><br>Sulfur<br>32.066    | 17<br><b>Cl</b><br>Chlorine<br>35.4527  | 18<br><b>Ar</b><br>Argon<br>39.948         |                                        |                                         |                                       |                                        |                                         |                                           |                                         |                                        |                                         |                                           |                                           |                                          |                                           |                                          |
| 19<br><b>K</b><br>Potassium<br>39.0983 | 20<br><b>Ca</b><br>Calcium<br>40.078    | 21<br><b>Sc</b><br>Scandium<br>44.955910 | 22<br><b>Ti</b><br>Titanium<br>47.867 | 23<br><b>V</b><br>Vanadium<br>50.9415   | 24<br><b>Cr</b><br>Chromium<br>51.9961 | 25<br><b>Mn</b><br>Manganese<br>54.938049 | 26<br><b>Fe</b><br>Iron<br>55.845   | 27<br><b>Co</b><br>Cobalt<br>58.933200 | 28<br><b>Ni</b><br>Nickel<br>58.6934   | 29<br><b>Cu</b><br>Copper<br>63.546  | 30<br><b>Zn</b><br>Zinc<br>65.38     | 31<br><b>Ga</b><br>Gallium<br>69.723    | 32<br><b>Ge</b><br>Germanium<br>72.61 | 33<br><b>As</b><br>Arsenic<br>74.92160  | 34<br><b>Se</b><br>Selenium<br>78.96 | 35<br><b>Br</b><br>Bromine<br>79.904     | 36<br><b>Kr</b><br>Krypton<br>83.80   | 37<br><b>Rb</b><br>Rubidium<br>85.4678    | 38<br><b>Sr</b><br>Strontium<br>87.62 | 39<br><b>Y</b><br>Yttrium<br>88.90585   | 40<br><b>Zr</b><br>Zirconium<br>91.224     | 41<br><b>Nb</b><br>Niobium<br>92.90638 | 42<br><b>Mo</b><br>Molybdenum<br>95.94  | 43<br><b>Tc</b><br>Technetium<br>(98) | 44<br><b>Ru</b><br>Ruthenium<br>101.07 | 45<br><b>Rh</b><br>Rhodium<br>102.90550 | 46<br><b>Pd</b><br>Palladium<br>106.42    | 47<br><b>Ag</b><br>Silver<br>107.8682   | 48<br><b>Cd</b><br>Cadmium<br>112.411  | 49<br><b>In</b><br>Indium<br>114.818    | 50<br><b>Sn</b><br>Tin<br>118.710         | 51<br><b>Sb</b><br>Antimony<br>121.760    | 52<br><b>Te</b><br>Tellurium<br>127.60   | 53<br><b>I</b><br>Iodine<br>126.90447     | 54<br><b>Xe</b><br>Xenon<br>131.29       |
| 55<br><b>Cs</b><br>Cesium<br>132.90545 | 56<br><b>Ba</b><br>Barium<br>137.327    | 57<br><b>La</b><br>Lanthanum<br>138.9055 | 72<br><b>Hf</b><br>Hafnium<br>178.49  | 73<br><b>Ta</b><br>Tantalum<br>180.9479 | 74<br><b>W</b><br>Tungsten<br>183.84   | 75<br><b>Re</b><br>Rhenium<br>186.207     | 76<br><b>Os</b><br>Osmium<br>190.23 | 77<br><b>Ir</b><br>Iridium<br>192.222  | 78<br><b>Pt</b><br>Platinum<br>195.078 | 79<br><b>Au</b><br>Gold<br>196.96655 | 80<br><b>Hg</b><br>Mercury<br>200.59 | 81<br><b>Tl</b><br>Thallium<br>204.3833 | 82<br><b>Pb</b><br>Lead<br>207.2      | 83<br><b>Bi</b><br>Bismuth<br>208.98038 | 84<br><b>Po</b><br>Polonium<br>(209) | 85<br><b>At</b><br>Astatine<br>(210)     | 86<br><b>Rn</b><br>Radon<br>(222)     | 87<br><b>Rb</b><br>Rubidium<br>(223)      | 88<br><b>Ra</b><br>Radium<br>(226)    | 89<br><b>Ac</b><br>Actinium<br>(227)    | 104<br><b>Rf</b><br>Rutherfordium<br>(261) | 105<br><b>Db</b><br>Dubnium<br>(262)   | 106<br><b>Sg</b><br>Seaborgium<br>(263) | 107<br><b>Bh</b><br>Bohrium<br>(264)  | 108<br><b>Hs</b><br>Hassium<br>(265)   | 109<br><b>Mt</b><br>Meitnerium<br>(266) | 110<br><b>Ds</b><br>Darmstadtium<br>(269) | 111<br><b>Uu</b><br>Ununennium<br>(271) | 112<br><b>Uub</b><br>Unbibium<br>(277) | 113<br><b>Uut</b><br>Ununtrium<br>(284) | 114<br><b>Uuq</b><br>Ununquadium<br>(289) | 115<br><b>Uup</b><br>Ununpentium<br>(294) | 116<br><b>Uuh</b><br>Ununhexium<br>(299) | 117<br><b>Uus</b><br>Ununseptium<br>(304) | 118<br><b>Uuo</b><br>Ununoctium<br>(315) |

# VARIATION OF NONMETALLIC PROPERTIES

Along the period – Non-metallic character increases as the tendency to gain electrons in the valence shell increases due to increasing nuclear charge.

Down the group – As the distance between the nucleus and valence shell increases, nuclear pull decreases. This decreases the tendency of an atom to gain an electron its valence shell, hence non-metallic character decreases.

## Metallic & Non metallic properties



General trends for the metallic character of an element  
(metallic character is the *opposite* of nonmetallic character)

# VARIATION OF ELECTRONEGATIVITY

Along the period – Electronegativity increases as the tendency to gain electrons in the valence shell increases due to increasing nuclear charge.

Down the group – As the distance between the nucleus and valence shell increases, nuclear pull decreases. This decreases the tendency of an atom to gain an electron, hence electronegativity decreases.

# INCREASING ELECTRONEGATIVITY

|                                  |                                   |                               |                               |                                  |                                |                                |                               |                              |                                |                              |                                |                                |                               |                                 |                               |                                |                             |                                  |                                 |                                  |                              |                                 |                              |                          |                             |                              |                          |                             |                              |                              |                           |
|----------------------------------|-----------------------------------|-------------------------------|-------------------------------|----------------------------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|--------------------------------|------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|-----------------------------|----------------------------------|---------------------------------|----------------------------------|------------------------------|---------------------------------|------------------------------|--------------------------|-----------------------------|------------------------------|--------------------------|-----------------------------|------------------------------|------------------------------|---------------------------|
| 1<br>H<br>Hydrogen<br>1.01784    |                                   |                               |                               |                                  |                                |                                |                               |                              |                                |                              |                                |                                |                               |                                 |                               |                                | 2<br>He<br>Helium<br>1.000  |                                  |                                 |                                  |                              |                                 |                              |                          |                             |                              |                          |                             |                              |                              |                           |
| 3<br>Li<br>Lithium<br>0.978      | 4<br>Be<br>Beryllium<br>1.5717147 |                               |                               |                                  |                                |                                |                               |                              |                                |                              |                                |                                |                               |                                 |                               |                                |                             | 5<br>B<br>Boron<br>2.041         | 6<br>C<br>Carbon<br>2.55635     | 7<br>N<br>Nitrogen<br>3.046944   | 8<br>O<br>Oxygen<br>3.439344 | 9<br>F<br>Fluorine<br>3.979403  | 10<br>Ne<br>Neon<br>4.79     |                          |                             |                              |                          |                             |                              |                              |                           |
| 11<br>Na<br>Sodium<br>0.933271   | 12<br>Mg<br>Magnesium<br>1.31204  |                               |                               |                                  |                                |                                |                               |                              |                                |                              |                                |                                |                               |                                 |                               |                                |                             | 13<br>Al<br>Aluminum<br>1.619994 | 14<br>Si<br>Silicon<br>1.904635 | 15<br>P<br>Phosphorus<br>2.19202 | 16<br>S<br>Sulfur<br>2.589   | 17<br>Cl<br>Chlorine<br>3.16327 | 18<br>Ar<br>Argon<br>3.24144 |                          |                             |                              |                          |                             |                              |                              |                           |
| 19<br>K<br>Potassium<br>0.821997 | 20<br>Ca<br>Calcium<br>0.929122   | 21<br>Sc<br>Scandium<br>1.36  | 22<br>Ti<br>Titanium<br>1.54  | 23<br>V<br>Vanadium<br>1.63      | 24<br>Cr<br>Chromium<br>1.66   | 25<br>Mn<br>Manganese<br>1.55  | 26<br>Fe<br>Iron<br>1.83      | 27<br>Co<br>Cobalt<br>1.88   | 28<br>Ni<br>Nickel<br>1.91     | 29<br>Cu<br>Copper<br>1.90   | 30<br>Zn<br>Zinc<br>1.65       | 31<br>Ga<br>Gallium<br>1.62    | 32<br>Ge<br>Germanium<br>2.01 | 33<br>As<br>Arsenic<br>2.18     | 34<br>Se<br>Selenium<br>2.55  | 35<br>Br<br>Bromine<br>2.96    | 36<br>Kr<br>Krypton<br>3.00 |                                  |                                 |                                  |                              |                                 |                              |                          |                             |                              |                          |                             |                              |                              |                           |
| 37<br>Rb<br>Rubidium<br>0.821997 | 38<br>Sr<br>Strontium<br>0.95     | 39<br>Y<br>Yttrium<br>1.22    | 40<br>Zr<br>Zirconium<br>1.22 | 41<br>Nb<br>Niobium<br>1.46      | 42<br>Mo<br>Molybdenum<br>1.46 | 43<br>Tc<br>Technetium<br>1.70 | 44<br>Ru<br>Ruthenium<br>1.61 | 45<br>Rh<br>Rhodium<br>1.61  | 46<br>Pd<br>Palladium<br>1.61  | 47<br>Ag<br>Silver<br>1.93   | 48<br>Cd<br>Cadmium<br>1.69    | 49<br>In<br>Indium<br>1.62     | 50<br>Sn<br>Tin<br>1.66       | 51<br>Sb<br>Antimony<br>1.66    | 52<br>Te<br>Tellurium<br>1.66 | 53<br>I<br>Iodine<br>2.5       | 54<br>Xe<br>Xenon<br>2.6    |                                  |                                 |                                  |                              |                                 |                              |                          |                             |                              |                          |                             |                              |                              |                           |
| 55<br>Cs<br>Cesium<br>0.79       | 56<br>Ba<br>Barium<br>0.89        | 57<br>La<br>Lanthanum<br>1.10 | 58<br>Ce<br>Cerium<br>1.12    | 59<br>Pr<br>Praseodymium<br>1.13 | 60<br>Nd<br>Neodymium<br>1.14  | 61<br>Pm<br>Promethium<br>1.13 | 62<br>Sm<br>Samarium<br>1.17  | 63<br>Eu<br>Europium<br>1.19 | 64<br>Gd<br>Gadolinium<br>1.20 | 65<br>Tb<br>Terbium<br>1.21  | 66<br>Dy<br>Dysprosium<br>1.22 | 67<br>Ho<br>Holmium<br>1.23    | 68<br>Er<br>Erbium<br>1.24    | 69<br>Tm<br>Thulium<br>1.25     | 70<br>Yb<br>Ytterbium<br>1.26 | 71<br>Lu<br>Lutetium<br>1.27   | 72<br>Hf<br>Hafnium<br>1.30 | 73<br>Ta<br>Tantalum<br>1.33     | 74<br>W<br>Tungsten<br>1.36     | 75<br>Re<br>Rhenium<br>1.37      | 76<br>Os<br>Osmium<br>1.38   | 77<br>Ir<br>Iridium<br>1.39     | 78<br>Pt<br>Platinum<br>1.40 | 79<br>Au<br>Gold<br>1.41 | 80<br>Hg<br>Mercury<br>1.42 | 81<br>Tl<br>Thallium<br>1.43 | 82<br>Pb<br>Lead<br>1.44 | 83<br>Bi<br>Bismuth<br>1.45 | 84<br>Po<br>Polonium<br>1.46 | 85<br>At<br>Astatine<br>1.47 | 86<br>Rn<br>Radon<br>1.48 |
| 87<br>Fr<br>Francium<br>0.7      | 88<br>Ra<br>Radium<br>0.9         | 89<br>Ac<br>Actinium<br>1.1   | 90<br>Th<br>Thorium<br>1.3    | 91<br>Pa<br>Protactinium<br>1.3  | 92<br>U<br>Uranium<br>1.3      | 93<br>Np<br>Neptunium<br>1.3   | 94<br>Pu<br>Plutonium<br>1.3  | 95<br>Am<br>Americium<br>1.3 | 96<br>Cm<br>Curium<br>1.3      | 97<br>Bk<br>Berkelium<br>1.3 | 98<br>Cf<br>Californium<br>1.3 | 99<br>Es<br>Einsteinium<br>1.3 | 100<br>Fm<br>Fermium<br>1.3   | 101<br>Md<br>Mendelevium<br>1.3 | 102<br>No<br>Nobelium<br>1.3  | 103<br>Lr<br>Lawrencium<br>1.3 |                             |                                  |                                 |                                  |                              |                                 |                              |                          |                             |                              |                          |                             |                              |                              |                           |

INCREASING ELECTRONEGATIVITY

# IONIZATION POTENTIAL

The amount of energy required by an isolated gaseous atom to lose an electron in its ground state.

## INCREASING IONIZATION ENERGY

|                                        |                                         |                                          |                                            |                                         |                                         |                                           |                                        |                                         |                                           |                                          |                                          |                                         |                                        |                                         |                                        |                                          |                                       |                                           |                                    |                                         |                                    |
|----------------------------------------|-----------------------------------------|------------------------------------------|--------------------------------------------|-----------------------------------------|-----------------------------------------|-------------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|---------------------------------------|-------------------------------------------|------------------------------------|-----------------------------------------|------------------------------------|
| 1<br><b>H</b><br>Hydrogen<br>1.00794   |                                         |                                          |                                            |                                         |                                         |                                           |                                        |                                         |                                           |                                          |                                          |                                         |                                        |                                         |                                        |                                          | 2<br><b>He</b><br>Helium<br>4.003     |                                           |                                    |                                         |                                    |
| 3<br><b>Li</b><br>Lithium<br>6.941     | 4<br><b>Be</b><br>Beryllium<br>9.012182 |                                          |                                            |                                         |                                         |                                           |                                        |                                         |                                           |                                          |                                          |                                         |                                        |                                         |                                        | 5<br><b>B</b><br>Boron<br>10.811         | 6<br><b>C</b><br>Carbon<br>12.0107    | 7<br><b>N</b><br>Nitrogen<br>14.00644     | 8<br><b>O</b><br>Oxygen<br>13.9994 | 9<br><b>F</b><br>Fluorine<br>18.9984032 | 10<br><b>Ne</b><br>Neon<br>20.1797 |
| 11<br><b>Na</b><br>Sodium<br>22.989770 | 12<br><b>Mg</b><br>Magnesium<br>24.3050 |                                          |                                            |                                         |                                         |                                           |                                        |                                         |                                           |                                          |                                          |                                         |                                        |                                         |                                        | 13<br><b>Al</b><br>Aluminum<br>26.981538 | 14<br><b>Si</b><br>Silicon<br>28.0855 | 15<br><b>P</b><br>Phosphorus<br>30.973761 | 16<br><b>S</b><br>Sulfur<br>32.066 | 17<br><b>Cl</b><br>Chlorine<br>35.4527  | 18<br><b>Ar</b><br>Argon<br>39.948 |
| 19<br><b>K</b><br>Potassium<br>39.0983 | 20<br><b>Ca</b><br>Calcium<br>40.078    | 21<br><b>Sc</b><br>Scandium<br>44.955910 | 22<br><b>Ti</b><br>Titanium<br>47.867      | 23<br><b>V</b><br>Vanadium<br>50.9415   | 24<br><b>Cr</b><br>Chromium<br>51.9961  | 25<br><b>Mn</b><br>Manganese<br>54.938049 | 26<br><b>Fe</b><br>Iron<br>55.845      | 27<br><b>Co</b><br>Cobalt<br>58.933200  | 28<br><b>Ni</b><br>Nickel<br>58.6934      | 29<br><b>Cu</b><br>Copper<br>63.546      | 30<br><b>Zn</b><br>Zinc<br>65.39         | 31<br><b>Ga</b><br>Gallium<br>69.723    | 32<br><b>Ge</b><br>Germanium<br>72.61  | 33<br><b>As</b><br>Arsenic<br>74.92160  | 34<br><b>Se</b><br>Selenium<br>78.96   | 35<br><b>Br</b><br>Bromine<br>79.904     | 36<br><b>Kr</b><br>Krypton<br>83.80   |                                           |                                    |                                         |                                    |
| 37<br><b>Rb</b><br>Rubidium<br>85.4678 | 38<br><b>Sr</b><br>Strontium<br>87.62   | 39<br><b>Y</b><br>Yttrium<br>88.90585    | 40<br><b>Zr</b><br>Zirconium<br>91.224     | 41<br><b>Nb</b><br>Niobium<br>92.90638  | 42<br><b>Mo</b><br>Molybdenum<br>95.94  | 43<br><b>Tc</b><br>Technetium<br>(98)     | 44<br><b>Ru</b><br>Ruthenium<br>101.07 | 45<br><b>Rh</b><br>Rhodium<br>102.90550 | 46<br><b>Pd</b><br>Palladium<br>106.42    | 47<br><b>Ag</b><br>Silver<br>107.8682    | 48<br><b>Cd</b><br>Cadmium<br>112.411    | 49<br><b>In</b><br>Indium<br>114.818    | 50<br><b>Sn</b><br>Tin<br>118.710      | 51<br><b>Sb</b><br>Antimony<br>121.760  | 52<br><b>Te</b><br>Tellurium<br>127.60 | 53<br><b>I</b><br>Iodine<br>126.90447    | 54<br><b>Xe</b><br>Xenon<br>131.29    |                                           |                                    |                                         |                                    |
| 55<br><b>Cs</b><br>Cesium<br>132.90545 | 56<br><b>Ba</b><br>Barium<br>137.327    | 57<br><b>La</b><br>Lanthanum<br>138.9055 | 72<br><b>Hf</b><br>Hafnium<br>178.49       | 73<br><b>Ta</b><br>Tantalum<br>180.9479 | 74<br><b>W</b><br>Tungsten<br>183.84    | 75<br><b>Re</b><br>Rhenium<br>186.207     | 76<br><b>Os</b><br>Osmium<br>190.23    | 77<br><b>Ir</b><br>Iridium<br>192.217   | 78<br><b>Pt</b><br>Platinum<br>195.078    | 79<br><b>Au</b><br>Gold<br>196.96655     | 80<br><b>Hg</b><br>Mercury<br>200.59     | 81<br><b>Tl</b><br>Thallium<br>204.3833 | 82<br><b>Pb</b><br>Lead<br>207.2       | 83<br><b>Bi</b><br>Bismuth<br>208.98038 | 84<br><b>Po</b><br>Polonium<br>(209)   | 85<br><b>At</b><br>Astatine<br>(210)     | 86<br><b>Rn</b><br>Radon<br>(222)     |                                           |                                    |                                         |                                    |
| 87<br><b>Fr</b><br>Francium<br>(223)   | 88<br><b>Ra</b><br>Radium<br>(226)      | 89<br><b>Ac</b><br>Actinium<br>(227)     | 104<br><b>Rf</b><br>Rutherfordium<br>(261) | 105<br><b>Db</b><br>Dubnium<br>(262)    | 106<br><b>Sg</b><br>Seaborgium<br>(263) | 107<br><b>Bh</b><br>Bohrium<br>(264)      | 108<br><b>Hs</b><br>Hassium<br>(265)   | 109<br><b>Mt</b><br>Meitnerium<br>(266) | 110<br><b>Ds</b><br>Darmstadtium<br>(269) | 111<br><b>Rg</b><br>Roentgenium<br>(272) | 112<br><b>Cn</b><br>Copernicium<br>(277) | 113<br><b>Nh</b><br>Nihonium<br>(284)   | 114<br><b>Fl</b><br>Flerovium<br>(289) |                                         |                                        |                                          |                                       |                                           |                                    |                                         |                                    |

INCREASING IONIZATION ENERGY

