# Trends Handout

name: _____

1. The periodic table has _____ groups, which run top to bottom.
2. The periodic table has _____ periods, which run left to right.
3. Elements that are chemically similar, that bond the same way, are found in the same _____.
4. All elements in any one period have the same number of _____.
5. The elements on the table are arranged in order of increasing _____ _____.
6. The atomic number is the number of _____ in the nucleus.
7. Because atoms are neutral, the atomic number also equals the number of negatively charged _____.
8. The atomic mass minus the atomic number equals the number of _____.

| List the symbols of the atoms in period 2, and their rounded atomic masses in AMU | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Symbols | | | | | | | | |
| Mass in AMU: | | | | | | | | |
| State the period trend for atomic mass: | | | | | | | | |

| List the symbols of the atoms in period 3, and their atomic radii in pm (picometers) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Symbols | | | | | | | | |
| Mass in AMU: | | | | | | | | |
| State the period trend for atomic size or radius: | | | | | | | | |

| Atoms of group 1 | | Atoms of group 2 | | Atoms of group 17 | |
|---|---|---|---|---|---|
| Symbol | Mass in AMU | Symbol | Radius in pm | Symbol | Mass AMU / Radius pm |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Using data from group 1, state the group trend for atomic mass in a complete sentence (not one word)

Using the data from group 2, state the group trend for atomic radius in a complete sentence (not one word)

Using all the data above, explain why atom radius size and mass always increases when descending any group.

Net nuclear charge is the "net" overall charge of just the nucleus of an atom.

All atoms are neutral because the number of positive protons always equals the same number of negative electrons.

This trend is not about the atoms, it's about only the nuclei, which are all positively charged.

| GROUP 16 | Net Nuclear Charge |
|---|---|
| O | |
| S | |
| Se | |
| Te | |

| GROUP 2 | Net Nuclear Charge |
|---|---|
| Be | |
| Mg | |
| Ca | |
| Sr | |
| Ba | |

| atom | Li | Be | B | C | N | O | F | Ne |
|---|---|---|---|---|---|---|---|---|
| Net Nuclear Charge | | | | | | | | |

State the group trend for net nuclear charge

State the period trend for net nuclear charge

Why do both of these trends exist?

| Trend #4 Electronegativity | | | |
|---|---|---|---|
| Define Electronegativity | | | |
| Define RELATIVE SCALE | | | |
| Define ARBITRARY SCALE | | | |
| state the group trend for electronegativity | | | |
| state the period trend for electronegativity | | | |
| Do all noble gases have a zero value for electronegativity? | | | |
| Which one doesn't? | | | |
| Circle the element in each pair with the higher electronegativity values | Cl or Ca | Sr or Ge | Br or Cs |
| For these 3 bonds, draw dipole arrows that show which side is more negative and which is more positive. | H—Br | C—Cl | B—I |

| Define 1st Ionization Energy | |
|---|---|
| What is the unit for 1st Ionization Energy | |

| Fill in this table | |
|---|---|
| Group 15 | 1st Ionization Energy kJ/mole |
| | |
| | |
| | |
| | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Period 5 | | | | | | | |
| 1st Ionization Energy kJ/mole | | | | | | | |

State the Group Trend for 1st Ionization Energy

State the Period Trend for 1st Ionization Energy

Explain what 2nd ionization energy is, and tell if it is greater or lesser than the 1st ionization energy (and why).

| GROUP 2 | ATOM electron configuration | Number of shells | CATION electron configuration | Number of shells |
|---|---|---|---|---|
| Be | | | | |
| Mg | | | | |
| Ca | | | | |
| Sr | | | | |
| Ba | | | | |
| Ra | | | | |

State the group trend for CATION SIZE.

Why is this trend increasing?

| | K | Ca | Sc | Ti |
|---|---|---|---|---|
| Electron configuration of an Atom | | | | |
| Electron configuration of a Cation | | | | |

State the period trend for CATION size.

Why is this trend decreasing?

| GROUP 17 | Atom electron configuration | Number of shells | Anion electron configuration | Number of shells |
|---|---|---|---|---|
| F | | | | |
| Cl | | | | |
| Br | | | | |
| I | | | | |

State the group trend for anion size

Why does this trend increase?

| Period 2 | N | O | F |
|---|---|---|---|
| Atom electron config | | | |
| Anion electron config | | | |
| | | | |
| Period 3 | P | S | Cl |
| Atom electron config | | | |
| Anion electron config | | | |

State the period trend for anion size

Why does this trend decrease?

| Cation and Anion Trends continues… | | | |
|---|---|---|---|
| A | Circle the species that is larger in radius, | an atom | its cation |
| B | Circle the species that is larger in radius, | an atom | its anion |
| C | Cations always notably smaller than the atoms they form from, explain why? | | |
| D | Anions always slightly larger than the atoms they form from, why? | | |

The most metallic element is (name/symbol) _____ / _____

The most nonmetallic element is (name/symbol) _____ / _____

| List the atomic numbers & symbols of ALL of the nonmetal elements (one example provided, and there are too many boxes here | | | | | 5 B | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | | | |
|---|---|---|---|
| Circle the most metallic of these elements | Y | Be | Fe |
| Circle the most nonmetallic of these elements | N | I | O |
| Circle the most metallic of these elements | Au | Cr | Pb |
| Circle the most nonmetallic of these elements | Kr | C | Cl |

| List all of their atomic numbers and their symbols in the boxes. | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| Define Metalloid | | | | | | |
| What about aluminum and polonium, they touch the stairs too, don't they? | | | | | | |

# Allotropes

Allotropes are pure forms of an element, but they are bonded differently than other pure forms of that same element. Common examples include CARBON and OXYGEN.

| Name the Three Carbon Allotropes | Name the Two Oxygen Allotropes |
|---|---|
| 1 | 1 |
| 2 | 2 |
| 3 | |
| Define isotope | |

| | |
|---|---|
| Name what the group 1 metals are known as | Name what the group 3-12 metals are known as |
| Name what the group 2 metals are known as | Name what the bottom 2 rows of metals are known as |
| Name what the group 17 nonmetals are known as | Name what the group 18 nonmetals are known as |
| How many protons are in manganese atoms? | What is the electron configuration for manganese? |
| How many neutrons are in manganese atoms? | ADD UP the electron configuration for Mn |
| Atoms with similar properties are found in the | Atoms with the same number of electron shells are found in the |
| What is the asterisk in element 72 about? | |
| What is the black bar next to elements 57 and 89 about? | |

| | |
|---|---|
| What group of atoms has the most stable electron configurations? | Who is element number 101 named for, and why is he important? |