

*Atom= _____

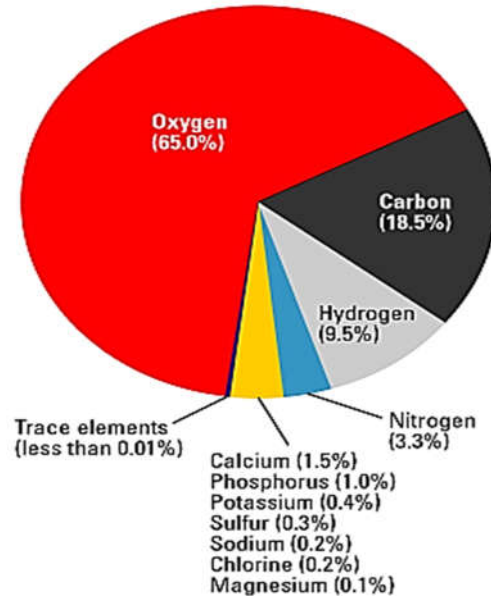
*Element= _____

*Ion are atoms that have a _____

In an ion, the _____

Elements of Life: Elements and Ions important in Biology (Life!)

• Elements of Life: “ _____ ”



• Important Ions and their Roles

Na^{1+} : plays a role in _____

Na^{1+} and K^{1+} : Play a role in _____

Mg^{2+} : _____

Ca^{2+} : plays a role in _____; found in _____.

Cl^{1-} : help balance the _____ in cells

I^{1-} : necessary to _____ (which plays a role in regulating metabolic rate)

| | |
|----------------|---------------------------|
| Group 1 | |
| 1.00794 | H 1 Hydrogen |

| | |
|---------|--------------------------|
| 4.00260 | He 2 Helium |
|---------|--------------------------|

Important Elements

Important Ions

Trace Elements

| | |
|---------------|-----------|
| Atomic mass | 28.0855 |
| Symbol | Si |
| Atomic number | 14 |
| Name | Silicon |

Transition Elements

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|-----------------------------|---------|------------------------------|----------|-----------------------------|---------|---------------------------------|---------|------------------------------|---------|-------------------------------|---------|------------------------------|---------|------------------------------|---------|-------------------------------|---------|----------------------------|---------|-------------------------------|---------|----------------------------|---------|-----------------------------|----------|------------------------------|---------|------------------------------|----------|-------------------------------|---------|---------------------------|-----------|------------------------------|---------|------------------------------|---------|------------------------------|---------|---------------------------|---------|------------------------------|---------|--------------------------------|---------|--------------------------------|---------|-----------------------------|---------|---------------------------------|---------|------------------------------|---------|--------------------------------|---------|
| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | | | | | | | | | | | | | | | | | | | | | | |
| 6.941 | Li 3 Lithium | 9.01218 | Be 4 Beryllium | 22.98977 | Na 11 Sodium | 44.9559 | Sc 21 Scandium | 47.88 | Ti 22 Titanium | 50.9415 | V 23 Vanadium | 51.996 | Cr 24 Chromium | 54.9380 | Mn 25 Manganese | 55.847 | Fe 26 Iron | 58.9332 | Co 27 Cobalt | 58.69 | Ni 28 Nickel | 63.546 | Cu 29 Copper | 65.39 | Zn 30 Zinc | 10.81 | B 5 Boron | 12.0111 | C 6 Carbon | 14.0067 | N 7 Nitrogen | 15.9994 | O 8 Oxygen | 18.998403 | F 9 Fluorine | 20.179 | Ne 10 Neon | | | | | | | | | | | | | | | | | | | |
| 22.98977 | Na 11 Sodium | 24.305 | Mg 12 Magnesium | 39.0983 | K 19 Potassium | 40.08 | Ca 20 Calcium | 87.62 | Sr 38 Strontium | 88.9059 | Y 39 Yttrium | 91.224 | Zr 40 Zirconium | 92.9064 | Nb 41 Niobium | 95.94 | Mo 42 Molybdenum | 102.906 | Rh 45 Rhodium | 106.42 | Pd 46 Palladium | 107.868 | Ag 47 Silver | 112.41 | Cd 48 Cadmium | 26.98154 | Al 13 Aluminum | 28.0855 | Si 14 Silicon | 30.97376 | P 15 Phosphorus | 32.06 | S 16 Sulfur | 35.453 | Cl 17 Chlorine | 39.948 | Ar 18 Argon | | | | | | | | | | | | | | | | | | | |
| 85.4678 | Rb 37 Rubidium | 87.62 | Sr 38 Strontium | 88.9059 | Y 39 Yttrium | 91.224 | Zr 40 Zirconium | 92.9064 | Nb 41 Niobium | 95.94 | Mo 42 Molybdenum | 102.906 | Rh 45 Rhodium | 106.42 | Pd 46 Palladium | 107.868 | Ag 47 Silver | 112.41 | Cd 48 Cadmium | 114.82 | In 49 Indium | 118.71 | Sn 50 Tin | 121.75 | Sb 51 Antimony | 127.60 | Te 52 Tellurium | 127.60 | Selenium | 126.905 | I 53 Iodine | 131.29 | Xe 54 Xenon | | | | | | | | | | | | | | | | | | | | | | | |
| 132.905 | Ba 56 Barium | 137.327 | La 57 Lanthanum | 138.905 | Ce 58 Cerium | 140.908 | Pr 59 Praseodymium | 140.908 | Nd 60 Neodymium | 140.908 | Pm 61 Promethium | 140.908 | Sm 62 Samarium | 140.908 | Eu 63 Europium | 140.908 | Gd 64 Gadolinium | 140.908 | Tb 65 Terbium | 140.908 | Dy 66 Dysprosium | 140.908 | Ho 67 Holmium | 140.908 | Er 68 Erbium | 140.908 | Tm 69 Thulium | 140.908 | Yb 70 Ytterbium | 140.908 | Lr 71 Lawrencium | 140.908 | U 92 Uranium | 140.908 | Np 93 Neptunium | 140.908 | Pu 94 Plutonium | 140.908 | Am 95 Americium | 140.908 | Cm 96 Curium | 140.908 | Bk 97 Berkelium | 140.908 | Cf 98 Californium | 140.908 | Es 99 Einsteinium | 140.908 | Fm 100 Fermium | 140.908 | Mn 101 Mendelevium | 140.908 | Nv 102 Nobelium | 140.908 | Lr 103 Lawrencium | 140.908 |

5 4 3 2 1

Structure of the Atom Simulation:

Go to <http://phet.colorado.edu/en/simulation/build-an-atom> and click on “run in html5”. Click on “Atom” and use the simulation to answer the following questions.

1. Place one proton in the atom. What is the charge of one proton (red)? _____
2. Remove the proton. Now place one neutron in the atom. What is the charge of one neutron (gray)? _____
3. Remove the neutron. Now place one electron in the atom. What is the charge of one electron (blue)? _____
4. Consider an atom that has just one proton in it (no neutrons or electrons).
 - What is the name of the element? _____
 - What is the mass number of the atom? _____
 - What is the charge of the atom? _____
5. Add another proton to the nucleus:
 - What is the name of the element? _____
 - What is the mass number of the atom? _____
 - What is the charge of the atom? _____
6. Keeping the # of protons at 2, add 1 neutron to the nucleus.
 - What is the name of the element? _____
 - What is the mass number of the atom? _____
 - What is the charge of the atom? _____

7. Add another neutron.

- What is the name of the element? _____
- What is the mass number of the atom? _____
- What is the charge of the atom? _____

8. Now consider an atom with 6 protons and 6 neutrons.

- Add 4 electrons to the atom. What is the charge of the atom? _____
- Add 2 more electrons to the atom. What is the charge of the atom now? _____
- Add 2 more electrons to the atom. What is the charge of the atom now? _____

Summary:

1. Based on your observations, which subatomic particle(s) determines the identity of an element?
2. Based on your observations, which subatomic particle(s) determine the mass of an atom?
3. Based on your observations, which subatomic particle(s) causes an element to have an overall positive or negative charge?

What can you determine about the structure of an atom of a specific element based on its information on the Periodic Table?

1. The following key gives you the information a periodic table provides about an atom of a specific element

| | | |
|---------------|---------|---------|
| Atomic mass | 28.0855 | 15.9994 |
| Symbol | Si | O |
| Atomic number | 14 | 8 |
| Name | Silicon | Oxygen |

2. Create an oxygen atom with a mass of 15 and a charge of +1 on your simulation. Determine how the number of protons, neutrons, and electrons relates to the atomic number and atomic mass.

- a. **The atomic number equal** to the number of _____
- b. **The mass number is equal** to _____ + _____
- c. Alter your oxygen atom so that it has a charge of 0 (neutral).

For neutral atoms, the number of electrons is = _____