Name: _____

Period: _____

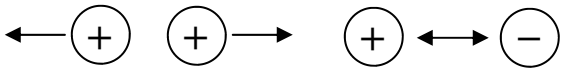
Charge and Electricity

Electric Charge

Charge is a fundamental property of matter, like mass. Objects are either positive, negative, or neutral.

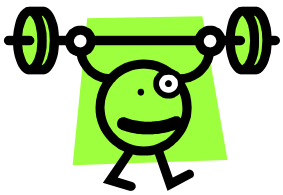
Electric charges works like magnetic poles:

Like charges repel **Opposites attract**



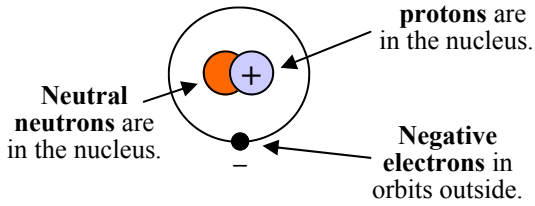
Charges can only move because of electrical forces.

The unit of electric charge is the coulomb.



Electrical forces are very strong! If 1 negative coulomb were 1 meter away from 1 positive coulomb the force would be 9 billion newtons! Yes, **9,000,000,000** N! This is how strong the forces are that hold molecules (and you) together.

Charges come from within the atom

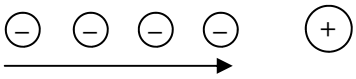


Hydrogen Atom
(*1 proton*)

Electrical forces cause electrons to move.

Electricity is moving electrons.

Moving electrons cause electricity.

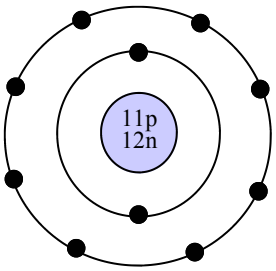


Net Charge

p – e = charge
(# of protons – # electrons = net charge)

A Sodium Ion: Na^{1+}

11 protons
10 electrons
p - e = charge
11—10 = 1
Net charge = +1



Any atom that is not neutral we call an ***ion***. Positive ions are called ***cations***. Negative ions are called ***anions***. Metals tend to become cations; non-metals tend to become anions. Cations attract anions and become ***neutral ionic compounds***

Positive sodium ions (Na^{1+}) attract negative chlorine atoms (Cl^{1-}) to make the ***ionic compound*** of NaCl: sodium chlorine, table salt.

Lightening is a huge build up of **static electricity** in the clouds, just like when you drag your feet across a carpet. When enough charge is built up to break through the air (ionizing it), lightening occurs, releasing the charge. You discharge static electricity when you touch a doorknob.

Charged objects try to discharge because all objects want to be electrically neutral.

Ionic Notation

Two easy steps:

1) Give the element symbol (found from number of protons). 11 protons is "sodium", or "Na".

11 protons; 10 electrons

Na^{1+}

2) Put the charge in the upper right corner (from p – e = charge and 11 - 10 = +1)

This ion notation tells us a sodium atom (11 protons) lost 1 electron (10 electrons) to be come a positive ion.

Example: Give the ion notation for an atom with 8 protons and 10 electrons.

Protons: 8
Element: Oxygen (O)
Charge: p - e = charge
8 - 10 = - 2

Ionic notation:

O^{2-}

Name: _____

Period: _____

Conductors versus Insulators

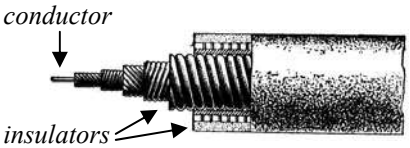
Conductors of electricity also conduct heat, thermal energy.

Conductors allow electricity to flow. Metals tend to be excellent conductors.

Insulators resist the flow of electricity. Conductors tend to be light or have "air holes".

Conductors tend to feel cold because they accept your heat easier.

Electrical wires have a metal center to conduct electricity surrounded by insulation for protection.

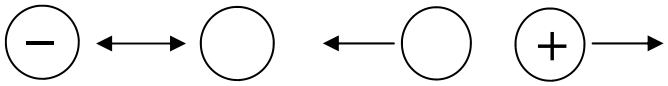


Pure water is a poor conductor: good for drinking, not so good for heat conduction. Sports drinks add salts and salt water is a very good thermal conductor.

1. Insulator	A. The charge that attracts protons.
2. Conductor	B. An atom with a different number of electrons than protons.
3. Positive	C. A material that resists the flow of electricity.
4. Negative	D. The caused by the flow of electrons.
5. Electricity	E. The charge that attracts electrons.
6. Ion	F. A material that does not resist electricity.

What are the charges of the second objects?

attracting *repelling*

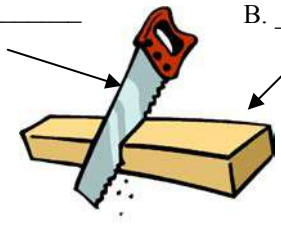


Insulator or **C**onductor?

____ Silver	____ Glass	____ Gold
____ Wood	____ Copper	____ Styrofoam
____ Air	____ Pure water	____ Aluminum

Label the parts of the object as conductor or insulator.

A. _____ B. _____



After you rub a balloon on your hair it might stick to a wall. Why? Be specific.

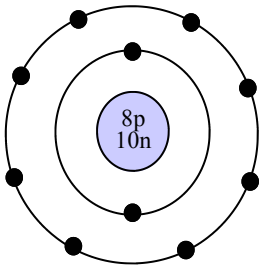
1. Electric charge	A. A unit in measuring the amount of charge
2. Static electricity	B. The pushes and pulls that electric charges exert on each other
3. Electrical force	C. Property of matter responsible for electrical events; it has two forms, positive and negative.
4. Coulomb	D. An object that has equal amounts of positive and negative charges.
5. Electrically neutral	E. A buildup of charge on an object.

An atom that loses electrons becomes positive/negative.

An atom that gains electrons becomes positive/negative.

What is the charge of an atom with 12 electrons and 10 protons?

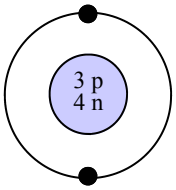
What element is it? Cation or anion?



Protons:
Electrons:
Net Charge:
Neutral or Ion?
(Cation or Anion)
Ion Notation:

(charge) →

(symbol) → _____ ___



Protons:
Electrons:
Net Charge:
Neutral or Ion?
(Cation or Anion)
Ion Notation:

What would happen if this atom were brought close to the atom above it?