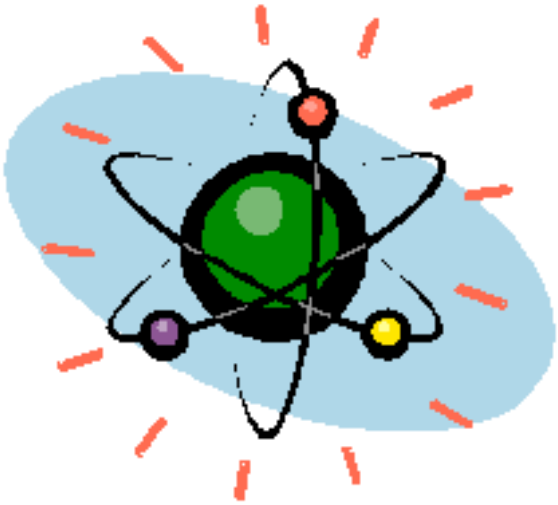
Charged up on Electrophoresis Pre-Assignment

ChE 1101 Fall 2005

IONS:



The building blocks of all matter are atoms. Atoms are composed of electrons (negative charges), protons (positive charges), and neutrons (neutral charges). The positive and negative charges are balanced (or equal) in a neutral atom. The protons and neutrons are located in the nucleus while the electrons are located in orbital "clouds" around the nucleus. The protons remain in the nucleus throughout chemical reactions, but the electrons can be lost or gained fairly easily. When these negative charges are either added or removed, a charged ion is formed. Read more at: http://www.chem4kids.com/files/atom_ions.html An atom that has lost a negative charge becomes an ion with a net positive charge. This is called a cation.

1. An anion is an ion with a net negative charge. What happened to the original neutral atom to form an anion? _____

_____

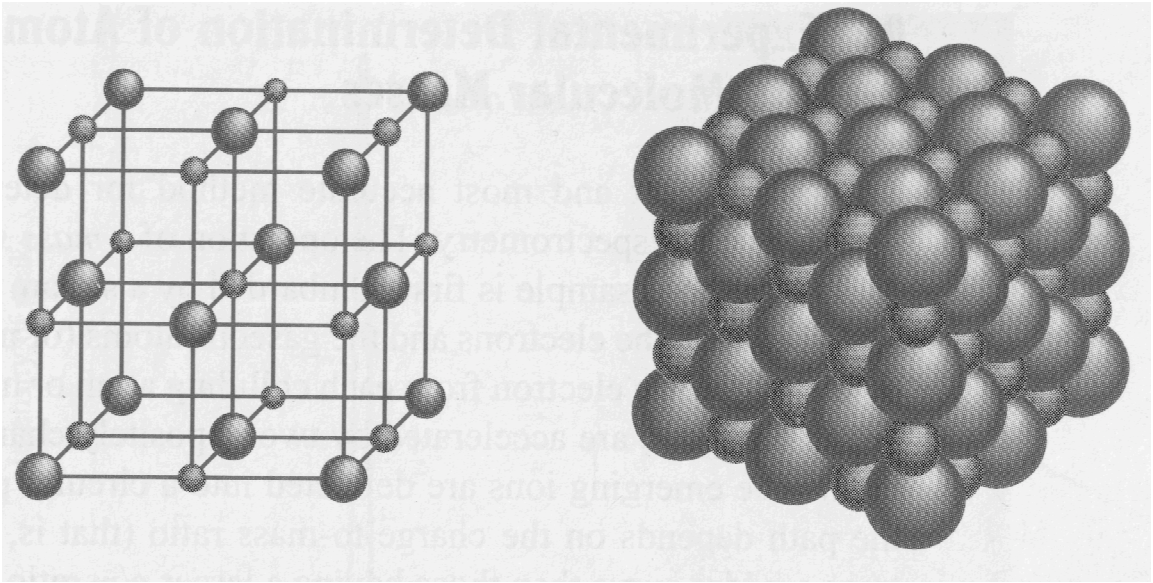
_____

A sodium atom (Na) can lose and electron to become a cation which we represent with Na^+.

	Na atom	*Na^+ ion (cation)*
	11 protons	11 protons
	11 electrons	10 electrons
net charge =	0	+1

A chlorine atom (Cl) can become an anion (represented by Cl^-) in the following manner.

	Cl atom	*Cl^- ion (anion)*
	17 protons	17 protons
	17 electrons	18 electrons
net charge =	0	-1



Opposite charges are attracted to each other so that a stable, neutral molecule forms. Salts are compounds containing cations and anions bonded together to form a molecule that readily dissolves in water. An example of this is sodium chloride (NaCl). The picture above shows the regular binding of solid NaCl. Have you ever noticed how table salt is made up of perfect cubes? In reality, the cations and anions are in direct contact as shown in the picture at right. The larger spheres are Cl^- and the smaller spheres are Na^+.

An atom can lose or gain more than one electron. An example of this is magnesium (Mg^{+2}) or sulfur (S^{-2}). These two can bind together to form magnesium sulfide (MgS). Notice that the charges in the molecule have to balance out too (+2 and –2 for the magnesium sulfide).

2. What happens if a sodium cation wants to bind to a sulfur anion? _____
_____

3. What about a magnesium cation binding to a chlorine anion? _____
_____

ELECTRICITY

Now we know that electricity can travel through water. Actually, that isn't entirely true; pure H_2O is a poor conductor of electricity. But water from your faucet is excellent. This is because tap water and water found in lakes, rivers, and oceans contain ions. Electricity is just a flow of electrons or negative charges. Ever notice how a battery has a negative end and a positive end and how it won't work in your radio if you put it in backwards?

In our next session, we are going to run an electrical current through a salt solution causing ions to move. With a chemical indicator, we will measure the accumulation of ions at the positive and negative electrodes. Please look up the following concepts and provide definitions.

4. electricity
5. ionic solutions
6. electrophoresis
7. cathode
8. anode
9. electrical potential
10. electrical field
11. mobility

Answers questions (1 through 11) in a Word file and upload onto webCT under the "Charged up on Electrophoresis" section.

Contact minerick@che.msstate.edu if you have any questions.