



Unit 4: Chemical Reactions

Lesson 3: Noble Gas Envy

Guiding Question: How can we use the periodic table to determine the charge on an ion?

Do Now:

What do you notice about the compounds in each group?

Group 1

NaCl

NaI

NaBr

Group 2

CaO

CaS

Group 3

HF

LiF

NaF

Recall

- How do we determine the number of protons?

Same as the atomic number

- How do we determine the number of neutrons?

Average atomic mass – atomic number = neutrons

- How do we determine the number of electrons?

In a *neutral atom*, same as the atomic number

- How do we determine the number of *valence* electrons?

Same as the group number

Noble Gas Envy

- Count how many valence electrons the element has.
 - An element needs 8 (second shell and higher) or 2 (first shell only) valence electrons to be happy
- Would it be “easier” to lose electrons or gain electrons to achieve a full shell?
 - For example: Nitrogen has 5 valence electrons. It can gain 3 electrons for a full shell, or lose it’s 5 valence electrons to drop down to the next full shell.
- Draw an arrow indicating the lost or gained electrons
- Determine the ion symbol. Nitrogen would gain 3 *negatively charged electrons*, therefore:

$$\boxed{7 \text{ positive (+) charges}} + \boxed{10 \text{ negative (-) charges}} = 3 \text{ negative charges}$$

Therefore, the ion symbol for nitrogen would be N^{3-}

Notes

- The charges on ions are quite predictable – *ions in the same group will have the same charge.*
- When electrons are removed from or added to an element, the rest of the atom stays the same. Since nothing happened to the protons, the atom is still the same element.
- The charge on an ion is noted with a superscript



**HOW DO YOU TELL THE
DIFFERENCE BETWEEN
ANIONS AND CATIONS?**

CATIONS ARE PAWSITIVE

Notes

ca⁺ion

Notes

egative

Notes

There are two types of ions:

- Cation: An ion with a net positive charge. Usually these are formed from metal atoms. Cats are pawwwsitive
- Anion: An ion with a net negative charge. Usually these are formed from nonmetal atoms. An(egative)ion

Notes

- The charges on transition metals are not as predictable. We will address them later in this section.
- After an electron transfer occurs, the electron arrangement of the resulting ions looks surprisingly like the electron arrangement of noble gases. Atoms tend to lose or gain electrons to attain the electron arrangement of the nearest noble gas.

Check in:

- Draw the formation of the following ions (draw a Bohr model, then the arrows showing electron movement):
 - Calcium
 - Nitrogen

Closure

- Answer guiding question on page 10.
- Homework #2 due Friday, 2/9 at the start of class.
 - DO NOT DO QUESTION #4 on back (about naming)
- Achieve 3000: Give Up Oil? Not So Fast! due Friday, 2/9 at 11:59 pm.