

Making An Ion

Purpose:

To analyze patterns of ion formation in order to develop a model that explains how an atom becomes a stable ion.

Getting Ready:

Visit the **Making An Ion** simulation at The Physics Classroom website:

<https://www.physicsclassroom.com/Physics-Interactives/Chemistry/Making-An-Ion>

Navigational Path:

www.physicsclassroom.com → Physics Interactives → Chemistry → Making an Ion

Background:

Atoms consist of protons (+), neutrons, and electrons (-). Protons and neutrons are located in the nucleus, the dense, central part of the atom. Electrons are located in electron shells of varying sizes, all centered around the nucleus. The largest, outermost shell that electrons occupy is referred to as the **valence shell**. In this activity, you will investigate how a neutral atom makes changes to its valence shell in order to become a charged ion.

Data Collection:

First collect and record data. If a cell is not specified, it's your free choice.

Group #	Element Symbol (at. #)	# of v.e. in Atom	Atom's Outer-Most Shell (circle)	e's Gained or Lost to form Ion? (circle)	# e's Gained or Lost to form Ion	# of v.e. in Ion	Ion's Outer-Most Shell (circle)	Charge on Ion (don't forget +/-)
1	Na (11)		1 2 3 4	G L			1 2 3 4	
2	Mg (12)		1 2 3 4	G L			1 2 3 4	
13	Al (13)		1 2 3 4	G L			1 2 3 4	
15	N (8)		1 2 3 4	G L			1 2 3 4	
16	O (11)		1 2 3 4	G L			1 2 3 4	
17	F (9)		1 2 3 4	G L			1 2 3 4	
2	Ca (20)		1 2 3 4	G L			1 2 3 4	
Free Choice	Free Choice		1 2 3 4	G L			1 2 3 4	
Free Choice	Free Choice		1 2 3 4	G L			1 2 3 4	
Free Choice	Free Choice		1 2 3 4	G L			1 2 3 4	
18	Free Choice		1 2 3 4					
18	Free Choice		1 2 3 4					

Analysis Questions:

1. Which group consists of elements whose atoms contain 8 ve's? _____
2. **Complete:** Metallic elements _____ (gain, lose) e's in order to acquire a valence shell with _____ e's. Their ions are _____ (+, -) and have the same # of ve's as the atoms of a Group _____ element.
3. **Complete:** Nonmetallic elements _____ (gain, lose) e's in order to acquire a valence shell with _____ e's. Their ions are _____ (+, -) and have the same # of ve's as the atoms of a Group _____ element.
4. **Complete:** An atom of a **Group 1** element has _____ ve's. This atom will _____ (gain, lose) _____ (enter a #) e⁻(s) and becomes an ion with a _____ charge. The ion has _____ ve's, which is the same as a Group _____ element.
5. **Complete:** An atom of a **Group 16** element has _____ ve's. This atom will _____ (gain, lose) _____ (enter a #) e⁻(s) and becomes an ion with a _____ charge. The ion has _____ ve's, which is the same as a Group _____ element.
6. **Free Choice ... Complete:** An atom of a **Group** _____ (not 1 nor 16) element has _____ ve's. This atom will _____ (gain, lose) _____ (enter a #) e⁻ and becomes an ion with a _____ charge. The ion has _____ ve's, which is the same as a Group _____ element.
7. Place a **T** or an **F** in the blank to identify the statement as being True (**T**) or False (**F**):
____ A neutral atom becomes charged positively by gaining protons.
____ An atom with that loses 2 electrons has a charge of -2.
____ A neutral atom does not possess any protons or electrons but only neutrons.
____ An ion becomes neutral by gaining neutrons.

Conclusion: Use your findings to describe a model that explains how and why an atom becomes an ion.