

IONIC BONDS

EVIDENCE NOTEBOOK

KEY IDEAS

1. Reaching a noble electron configuration
 - a. Magnesium would (*circle the best choice*) **gain** | **lose** _____ electron(s) to have an electron configuration like (*which element*) _____.
 - b. Sulfur would **gain** | **lose** _____ electron(s) to have an electron configuration like (*which element*) _____.

2. Cations and the periodic table
 - a. Where are the 1+ ions located on the periodic table?

A standard periodic table of elements. The groups 1, 2, and 13-18 are highlighted with a light blue background, representing the elements that form 1+, 2+, and 3+ ions respectively.

- b. Where are the 2+ ions located on the periodic table?
- c. Where are the 3+ ions located on the periodic table?

- d. Where are the 4+/4- ions located on the periodic table?

3. Anions and the periodic table
 - a. Where are the 1- ions located on the periodic table?

A standard periodic table of elements. The groups 15, 16, and 17 are highlighted with a light blue background, representing the elements that form 1-, 2-, and 3- ions respectively.

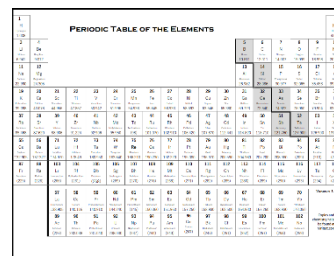
- b. Where are the 2- ions located on the periodic table?
- c. Where are the 3- ions located on the periodic table?

- d. Where are the noble gasses located, the elements that do not change to become stable electron configurations?

4. Transition metals

a. Which block(s) are the *main group elements* located in?

b. Which block are the *transition metals* located in?



c. The reason *transition metals* are not considered *main group elements* is that transition metals can have _____ charges when they become ions.

d. Complete the table by writing the name or symbol for the following ions:

Stock System for Naming

Ion Name	Ion Symbol
Copper (I)	
Copper (II)	
Iron (II)	
Iron (III)	
Nickel (II)	
Nickel (III)	

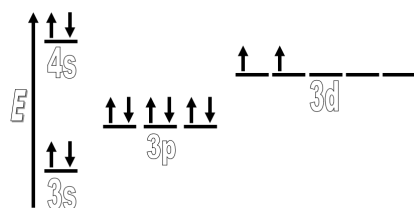
Ion Name	Ion Symbol
	Cr ²⁺
	Cr ³⁺
	Cd ²⁺
	Ti ²⁺
	Ti ³⁺
	Ti ⁴⁺

e. The **stock** (an easier and more modern) **system** for naming uses roman numerals to represent the charge of a transition metal ion. The **common system** recognizes that many transition metals have two common ionic forms. The common system uses two suffixes (*-ic* and *-ous*) at the end of the original name for the elements. Write the common names for iron and copper ions:

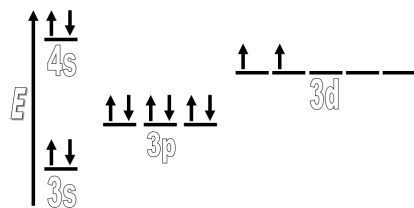
Atom	Charge	Common Name
Iron	Fe ²⁺	
	Fe ³⁺	
Copper	Cu ⁺	
	Cu ²⁺	

5. Titanium's ionic charges

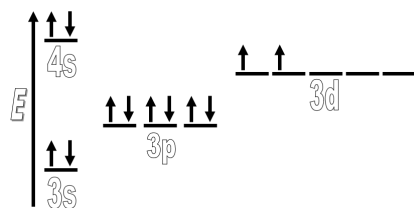
a. Illustrate what happens to the electrons when titanium becomes Ti^{2+} :



b. Illustrate what happens to the electrons when titanium becomes Ti^{3+} :

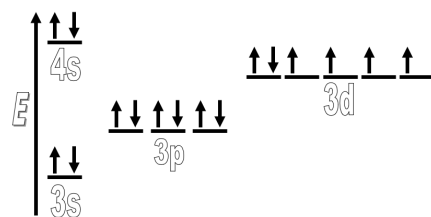


c. Illustrate what happens to the electrons when titanium becomes Ti^{4+} :

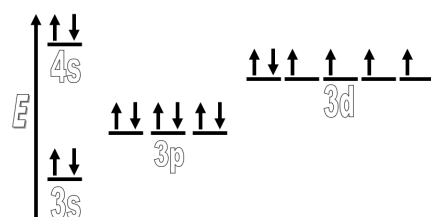


6. Iron's ionic charges

a. Illustrate what happens to the electrons when iron becomes Fe^{2+} :

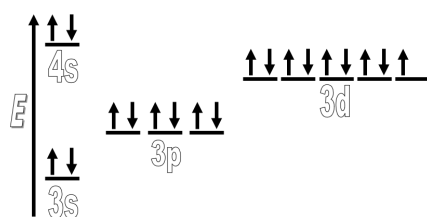


b. Illustrate what happens to the electrons when iron becomes Fe^{3+} :

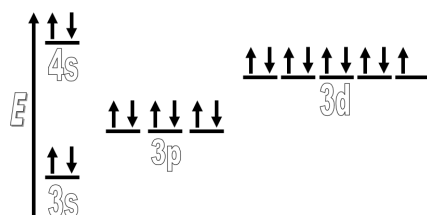


7. Copper's ionic charges

a. Illustrate what happens to the electrons when copper becomes Cu^+ :



b. Illustrate what happens to the electrons when copper becomes Cu^{2+} :



8. Name the following polyatomic ions:

Name	Symbol
	$\text{C}_2\text{H}_3\text{O}_2^-$
	CO_3^{2-}
	HCO_3^-

Name	Symbol
	OH^-
	NO_3^-
	NO_2^-

The following is a list of common **polyatomic ions** that are used in chemistry. Keep this list as reference throughout the course:

- | | |
|---|---|
| 1. Ammonium NH_4^+ | 14. Thiocyanate SCN^- |
| 2. Acetate $\text{C}_2\text{H}_3\text{O}_2^-$ | 15. Iodate IO_3^- |
| 3. Carbonate CO_3^{2-} | 16. Hydroxide OH^- |
| 4. Bicarbonate HCO_3^- | 17. Peroxide O_2^{2-} |
| 5. Bromate BrO_3^- | 18. Permanganate MnO_4^- |
| 6. Bromite BrO_2^- | 19. Nitrate NO_3^- |
| 7. Perchlorate ClO_4^- | 20. Nitrite NO_2^- |
| 8. Chlorate ClO_3^- | 21. Phosphate PO_4^{3-} |
| 9. Chlorite ClO_2^- | 22. Sulfate SO_4^{2-} |
| 10. Hypochlorite ClO^- | 23. Sulfite SO_3^{2-} |
| 11. Chromate CrO_4^{2-} | 24. Thiosulfate $\text{S}_2\text{O}_3^{2-}$ |
| 12. Dichromate $\text{Cr}_2\text{O}_7^{2-}$ | 25. Silicate SiO_3^{2-} |
| 13. Cyanide CN^- | |

9. Ionic bonds

- a. An ionic bond is formed by the _____ between _____ charged ions.
- b. Sodium chloride (NaCl) (*circle the best choice*) is | is not charged. It is made of ions that neutralize | magnify each other.

10. Write the chemical formula for aluminum fluoride

- a. Step 1: List the symbols for each ion:

- b. Step 2: Write the symbols with the cation first:

- c. Step 3: Find the least common multiple:

- d. Step 4: Write the formula:

- e. Illustrate aluminum fluoride using the visual model where lines are drawn connecting the + and - charges:

- f. Determine **aluminum fluoride** using the *cross charges and reduce method*.

- g. Determine **calcium oxide** using the *cross charges and reduce method*.

IONIC FORMULA GAME

- | | |
|------------------------|---------------------------|
| 1. Sodium fluoride | 7. Calcium phosphate |
| 2. Cesium oxide | 8. Cesium fluoride |
| 3. Aluminum hydroxide | 9. Aluminum nitrate |
| 4. Cupric nitrate | 10. Sodium hydroxide |
| 5. Cuprous carbonate | 11. Mercury (I) phosphate |
| 6. Mercury (I) sulfite | 12. Aluminum sulfite |

NAME: _____ DATE: _____ PERIOD: _____

CHECKPOINTS

Write the ionic formulas for the following ionic compounds:

1. Potassium bromide
2. Calcium hydroxide
3. Sodium nitrate
4. Nickel (III) oxide
5. Cuprous acetate
6. Ferric carbonate
7. Titanium (IV) nitride

Write the name for the following compounds:

8. LiBr
9. Na₂S
10. AlO₃
11. CsNO₂
12. Fe(C₂H₃O₂)₂
13. CuHCO₃
14. Cr₂(CO₃)₃