

Warm Up:

What **charge** do the following elements form when they form ions?

O

K

N

Cs

Se

Li

S

Mg

## Warm Up

Which of the following is the smallest atom?

Sr

Ba

Be

Mg

# Objectives:

## TSWBAT:

- Predict bonding (ionic or covalent) and the shape of simple compounds by using Lewis dot structures and oxidation numbers.
- Interpret the names and formulae for ionic and covalent compounds.
- Explain how the types of intermolecular forces present in a compound affect the physical properties of the compounds (e.g. polarity and molecular shape.)

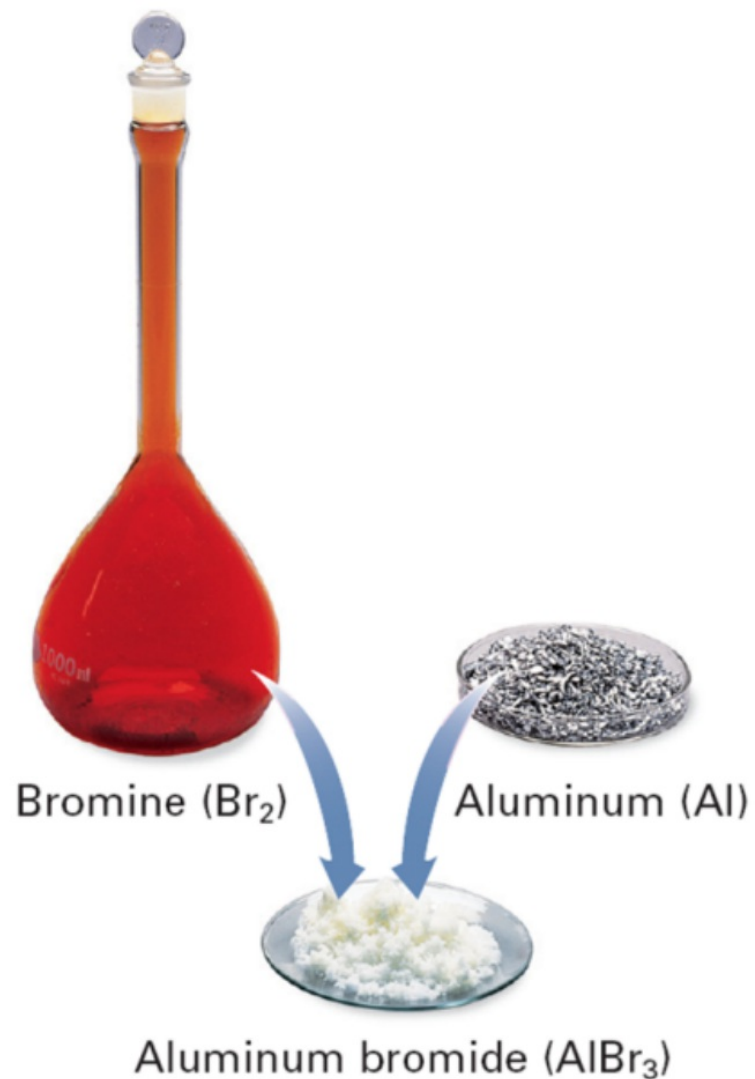
## Ionic Bonds and Ionic Compounds:

Compounds composed of cations and anions are called **ionic compounds**.

Although they are composed of ions, **ionic compounds are electrically neutral**.

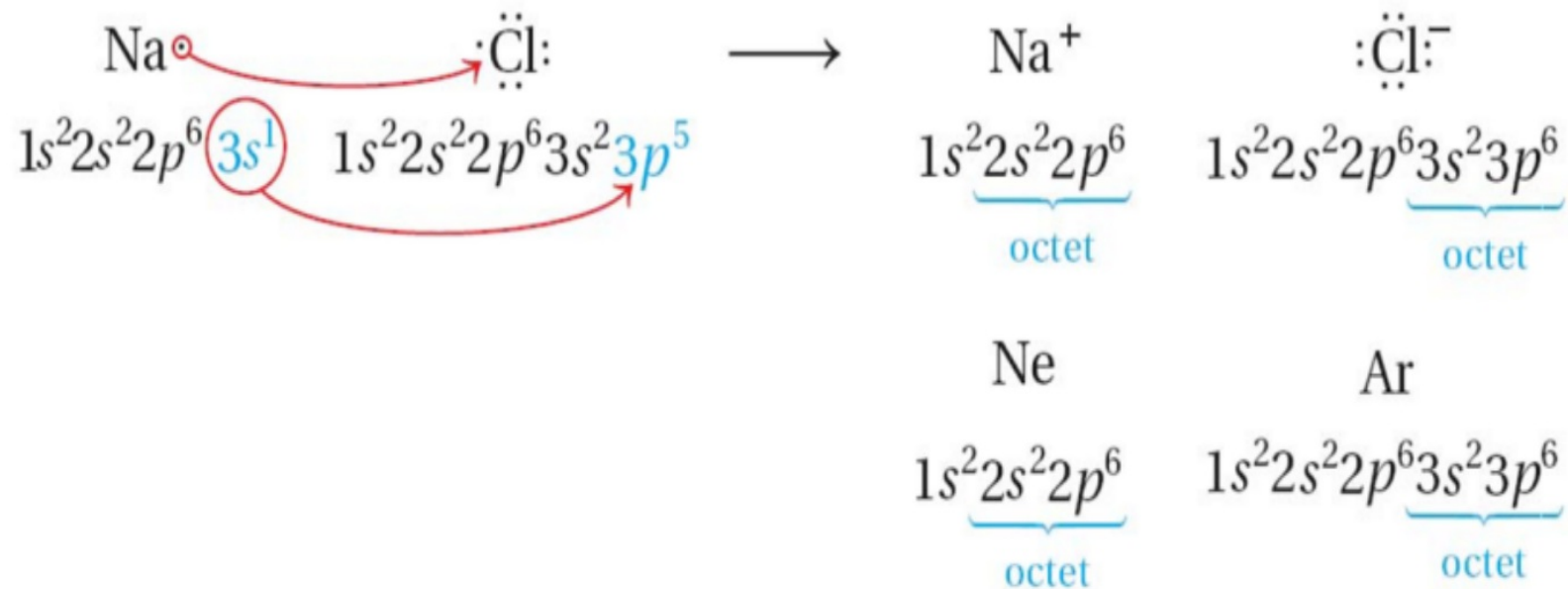
**What does that mean?**

Aluminum metal and the nonmetal bromine react to form an ionic solid, aluminum bromide.



## Ionic Bonds

The electrostatic forces that hold ions together in ionic compounds are called **ionic bonds**.



- **A chemical formula** shows the kinds and numbers of atoms in the smallest representative unit of a substance.

- **A formula unit** is the lowest whole-number ratio of ions in an ionic compound.

## Predicting Formulas of Ionic Compounds

The ionic compound formed from potassium and oxygen is used in ceramic glazes.

Use electron dot structures to predict the formulas of the ionic compounds formed from the following elements:

- a. potassium and oxygen
- b. magnesium and nitrogen

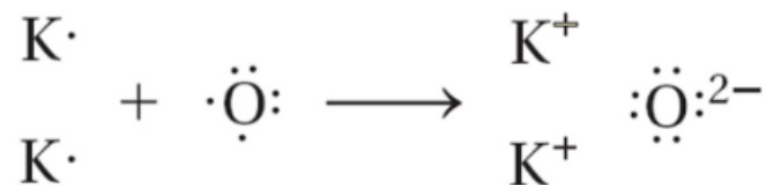


**2 Solve** *Apply concepts to this situation.*

a. Start with the atoms.

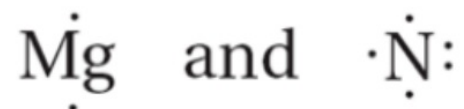


In order to have a completely filled valence shell, oxygen must gain two electrons. These electrons come from two potassium atoms, each of which loses one electron.

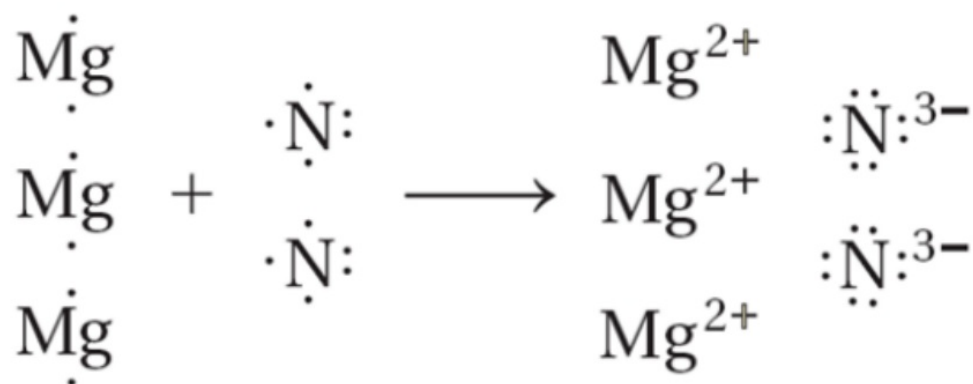


Electrons lost now equals electrons gained.  
The formula of the compound formed (potassium oxide) is  $\text{K}_2\text{O}$ .

**b.** Start with the atoms.



Each nitrogen needs three electrons to have an octet, but each magnesium can lose only two electrons. Thus three magnesium atoms are needed for every two nitrogen atoms.



The formula of the compound formed (magnesium nitride) is  $\text{Mg}_3\text{N}_2$ .

Use electron dot structures to determine formulas of the ionic compounds formed when:

- a. potassium reacts with iodine.
- b. aluminum reacts with oxygen.

## Warm Up

Predict the formula for the following combinations. Use electron dot structures.

Boron and bromine

Lithium and nitrogen

Strontium and phosphorus

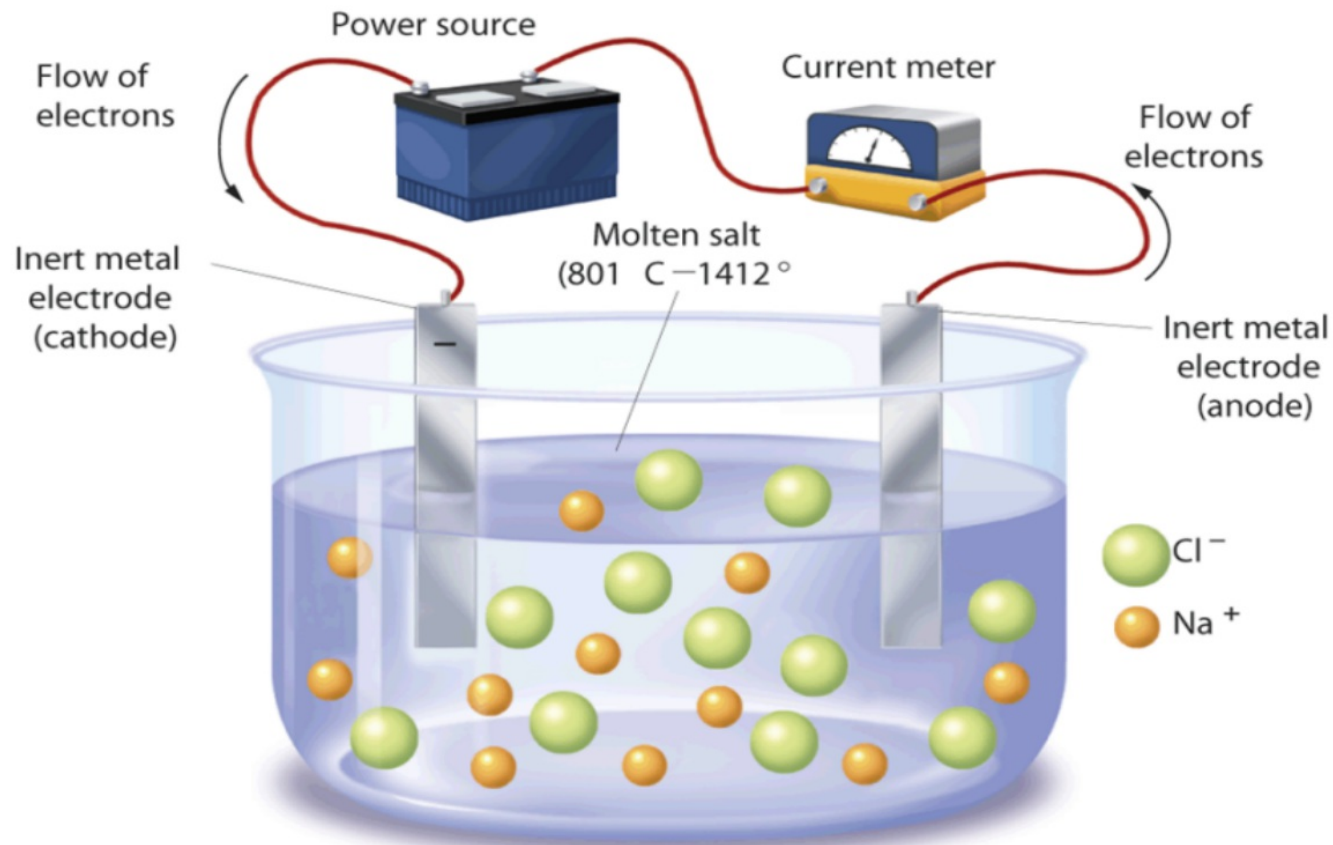
## Properties of Ionic Compounds

What are three properties of ionic compounds?

**1. Most ionic compounds are crystalline solids at room temperature.**

**2. Ionic compounds generally have high melting points.**

### 3. Ionic compounds can conduct an electric current when melted or dissolved in water.



1. Which chemical formula is incorrect?

a. NaBr

b. CaS

c. MgO

d.  $\text{KF}_2$



## **2. Ionic compounds can conduct an electric current**

- a. only when melted.**
- b. when melted or dissolved in water.**
- c. only when dissolved in water.**
- d. when solid or melted.**

**3. At room temperature, most ionic compounds are**

- a. crystalline solids.**
- b. liquids.**
- c. gases.**
- d. soft, low melting-point solids.**

**Practice:**

**What is the formula for:**

- 1. Calcium oxide**
- 2. Strontium chloride**
- 3. Lithium fluoride**
- 4. Aluminum selenide**

## Warm Up

Write the chemical formulas for:

1. Rubidium selenide
2. Barium fluoride
3. Boron oxide

What is the proper name for:

1.  $K_2Cl$
2.  $BeS$

# Practice Problems:

p. 199

#14-16,

#18-20

*Warm Up*

*What is the formula of Strontium phosphide? Show electron dots also.*





