

a. mang  
b. lithi

MgO<sub>2</sub>  
SnF<sub>2</sub>

anions

STURMAN BHS

STURMAN KEY

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

7

## 7 IONIC AND METALLIC BONDING

### Practice Problems

In your notebook, answer the following.

#### SECTION 7.1 IONS

- For each element below, state (i) the number of valence electrons in the atom, (ii) the electron dot structure, and (iii) the chemical symbol(s) for the most stable ion.
  - Ba  $2, Ba^{2+}$
  - I  $7, I^{-}$
  - K  $1, K^{+}$
  - gallium  $3$
  - fluorine  $7$
  - selenium  $6$
- Write the electron configuration for each of the following atoms and ions.
  - Ca  $[Ar] 4s^2$
  - Na  $[Ne]$
  - O  $2^{-}$
  - chlorine atom  $[Ne] 3s^2 3p^5$
  - phosphide ion  $[Ar]$
- What is the relationship between the group number of the representative elements and the number of valence electrons? *They are the same.*
- How many electrons will each element gain or lose in forming an ion? State whether the resulting ion is a cation or an anion.
  - strontium *loses 2, cation*
  - tellurium *gains 2, anion*
  - bromine *gains 1, anion*
  - aluminum *loses 3, cation*
  - rubidium *loses 1, cation*
  - phosphorus *gains 3, anion*
- Give the name and symbol of the ion formed when
  - a chlorine atom *gains one electron. Chloride, Cl<sup>-</sup>*
  - a potassium atom *loses one electron. potassium ion, K<sup>+</sup>*
  - an oxygen atom *gains two electrons. oxide, O<sup>2-</sup>*
  - a barium atom *loses two electrons. barium ion, Ba<sup>2+</sup>*
- How many electrons are lost or gained in forming each of the following ions?
  - Mg<sup>2+</sup> *2 lost*
  - Br<sup>-</sup> *1 gained*
  - Ag<sup>+</sup> *1 lost*
  - Fe<sup>3+</sup> *3 lost*
- Classify each of the following as a cation or an anion.
  - Na<sup>+</sup> *cation*
  - I<sup>-</sup> *anion*
  - Ca<sup>2+</sup> *cation*
  - Cu<sup>2+</sup> *cation*
  - O<sup>2-</sup> *anion*
  - Cs<sup>+</sup> *cation*

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## SECTION 7.2 IONIC BONDS AND IONIC COMPOUNDS

- Use electron dot structures to predict the formula of the ionic compounds formed when the following elements combine.
  - sodium and bromine *NaBr*
  - sodium and sulfur *Na<sub>2</sub>S*
  - calcium and iodine *CaI<sub>2</sub>*
- Which of these combinations of elements are most likely to react to form ionic compounds?
  - sodium and magnesium *Nope*
  - barium and sulfur *Yes!*
  - potassium and iodine *Yes!*
  - oxygen and argon *Nope.*
- What is the meaning of coordination number? *# of opp charged ions that surround an ion in a crystal.*
- How is the coordination number determined? *count on a diagram*

d. aluminum and oxygen *Al<sub>2</sub>O<sub>3</sub>*  
e. barium and chlorine *BaCl<sub>2</sub>*

## SECTION 7.3 BONDING IN METALS

- What is a metallic bond? *A bond between metal cations or mobile valence e<sup>-</sup>.*
- How is the electrical conductivity of a metal explained by metallic bonds? *The e<sup>-</sup> are free to move.*
- Are metals crystalline? Explain. *Yes. Compact, orderly pattern.*
- Give three possible crystalline arrangements of metals. Describe each. *Body-centered cubic, face-centered cubic, hexagonal close packed.*
- What is an alloy? *Mix of 2 or more metals.*
- Name the principal elements present in each of the following alloys.
  - brass *Cu + Zn*
  - bronze *Cu + Sn*
  - stainless steel *Fe, Cr, C, Ni*
  - sterling silver *Ag + Cu*
  - cast iron *Fe + C*
  - spring steel *Fe, C, Cr*

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