

## 22 • The Chemistry of the Main Group Elements

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### STUDY QUESTIONS

- Predict the formulas of the compounds that will result when the following elements react:  
Na and P<sub>4</sub>  
Al and Br<sub>2</sub>  
Ca and O<sub>2</sub>  
Cl<sub>2</sub> and Si
- Write formulas for the following compounds based upon the formulas for elements in the same group that are shown.
  - Water H<sub>2</sub>O                  hydrogen selenide
  - Ammonia NH<sub>3</sub>                nitrogen triiodide
  - Chlorate ClO<sub>3</sub><sup>-</sup>                iodate ion
  - Triiodide I<sub>3</sub><sup>-</sup>                  difluorochloride
  - Bromine Br<sub>2</sub>                  iodine monochloride
- Which formulas in the following series are incorrect
  - CaCl<sub>2</sub>, CaS, KCl, KS
  - NH<sub>3</sub>, PH<sub>3</sub>, CH<sub>3</sub>, GeH<sub>4</sub>
  - C<sub>60</sub>, S<sub>8</sub>, P<sub>4</sub>, O<sub>3</sub>, Br, Xe
- List the methods used for industrial production of the following elements:
  - hydrogen
  - sodium
  - potassium
  - magnesium
  - aluminum
  - silicon
  - nitrogen
  - phosphorus
  - oxygen
  - sulfur
  - chlorine

5. List some of the major uses for the following elements or their compounds:
  - a. hydrogen
  - b. sodium
  - c. magnesium
  - d. aluminum
  - e. silicon
  - f. nitrogen
  - g. phosphorus
  - i. oxygen
  - j. sulfur
  - k. chlorine
  
6. Classify the following hydrides:  
 $\text{SiH}_4$ ,  $\text{CaH}_2$ ,  $\text{HI}$ ,  $\text{H}_2\text{Se}$
  
7. How does a peroxide or superoxide differ from an oxide ion? Describe the reaction between carbon dioxide and potassium superoxide.
  
8. Write formulas for the following compounds:  
sodium chloride  
potassium hypochlorite  
phosphine  
magnesium nitrate  
dinitrogen tetroxide  
aluminum bromide  
sulfuric acid  
calcium sulfate  
nitric acid  
methanol  
dolomite  
limestone  
phosphoric acid  
baking soda