

## 6 THE PERIODIC TABLE

### Practice Problems

In your notebook, solve the following problems.

#### SECTION 6.1 ORGANIZING THE ELEMENTS

- Which element listed below should have chemical properties similar to fluorine (F)?
  - Li
  - Si
  - Br in same group.
  - Ne
- Identify each element as a metal, metalloid, or nonmetal.
  - fluorine non-metal
  - germanium metalloid
  - zinc metal
  - phosphorus non-metal
  - lithium metal
- Which of the following is not a transition metal?
  - magnesium
  - titanium
  - chromium
  - mercury

- Name two elements that have properties similar to those of the element potassium. Any 2 of these will do: Lithium, Sodium, Rubidium, Cesium, Francium, Potassium, Sodium, Rubidium, Cesium, Francium (Rb), (Cs)
- Elements in the periodic table can be divided into three broad classes based on their general characteristics. What are these classes and how do they differ?
 

3 classes

- Metals: good conductors of heat & electric current, high luster, malleable, ductile
- Non-metals: poor conductors of heat & electric current, non-lustrous, solid metals tend to be brittle
- Metalloids: have properties similar to metals & non-metals, depending on the conditions.

#### SECTION 6.2 CLASSIFYING THE ELEMENTS

- Use the periodic table to write the electron configuration for silicon. Explain your thinking.  $[Ne] 3s^2 3p^2$
- Use the periodic table to write the electron configuration for iodine. Explain your thinking.  $[Kr] 4d^{10} 5s^2 5p^5$
- Which group of elements is characterized by an  $s^2 p^3$  configuration? Nitrogen (3rd column in p block)
- Name the element that matches the following description.
  - one that has 5 electrons in the third energy level. Phosphorus
  - one with an electron configuration that ends in  $4s^2 4p^5$ . Bromine  $\Rightarrow$  (5th row in p-block + period 4)
  - the Group 6A element in period 4. Selenium
- Identify the elements that have electron configurations that end as follows.
  - $2s^2 2p^4$  Oxygen p indicates 4th column in p-block + 2nd period.
  - $4s^2$  Calcium s<sup>2</sup> indicates 2nd column in s-block + 4th period.
  - $3d^{10} 4s^2$  Zinc d<sup>10</sup> indicates 10th column in d-block + 4th period.
- What is the common characteristic of the electron configurations of the elements Ne and Ar? In which group would you find them? noble gases completely filled
- Why would you expect lithium (Li) and sulfur (S) to have different chemical and physical properties? Different groups + diff e<sup>-</sup> configurations. highest energy levels? noble gases.
- What characterizes the electron configurations of transition metals such as silver (Ag) and iron (Fe)? have e<sup>-</sup> in highest s + highest d. or 8A

#### SECTION 6.3 PERIODIC TRENDS

- Explain why a magnesium atom is smaller than atoms of both sodium and calcium.  $Mg < Na$  since elec. charge. draw in closer.  $Mg < Ca$  since Ca e<sup>-</sup> orbitals are further out.
- Predict the size of the astatine (At) atom compared to that of tellurium (Te). Explain your prediction.  $At > Te$  since higher energy level. have more energy (since is a higher energy level).
- Would you expect a Cl<sup>-</sup> ion to be larger or smaller than an Mg<sup>2+</sup> ion? Explain. Cl<sup>-</sup> is larger. Mg<sup>2+</sup> is smaller. (since is a higher energy level).
- Which effect on atomic size is more significant, an increase in nuclear charge across a period or an increase in occupied energy levels within a group? Explain. Nuclear charge is more significant. adding on another layer in (like any atom) makes it larger.
- Explain why the sulfide ion (S<sup>2-</sup>) is larger than the chloride ion (Cl<sup>-</sup>). It gained 2 e<sup>-</sup>. (like any anion) makes it larger.
- Compare the first ionization energy of sodium to that of potassium. Potassium is lower. K is less since farther away from nucleus.
- Compare the first ionization energy of lithium to that of beryllium. Beryllium is higher.
- Is the electronegativity of barium larger or smaller than that of strontium? Explain. smaller.
- What is the most likely ion for magnesium to form? Explain.  $Mg^{2+}$
- Arrange oxygen, fluorine, and sulfur in order of increasing electronegativity. S, O, F

OK

20%