HW 7.9 Periodic Table & Electron Configuration (31 pts)

Part 1: Multiple choice. (3pts total)

1. Compared to the atoms of nonmetals in Period 3, the atoms of metals in Period 3 have
   a. fewer valence electrons
   b. more valence electrons
   c. fewer electron shells
   d. more electron shells

2. The elements on the Periodic table are arranged in order of increasing
   a. atomic number
   b. mass number
   c. number of isotopes
   d. number of moles

3. Which element has chemical properties that are most similar to the chemical properties of sodium?
   a. beryllium
   b. lithium
   c. calcium
   d. magnesium

4. The reactivity of an element is mostly determined by
   a. behavior of core electrons
   b. behavior of valence electrons
   c. total number of electrons
   d. number of protons

5. Which list of elements consists of a metal, a metalloid, and a nonmetal?
   a. Li, Na, Rb
   b. Sn, Si, C
   c. Cr, Mo, W
   d. O, S, Te

6. Which ion(s) have the same electron configuration as Neon?
   a. F-
   b. O^{2-}
   c. Mg^{2+}
   d. Na^{+}
   e. all of the above

   all have 10 electrons w/ full outer shell

Part 2: Short answer.

7. What is the shape of each electron orbital? (1pt)
   \[ S = \circ \quad p = \leftrightarrow \quad d = \varnothing \quad f = \text{can't draw} \]

8. How many electrons can each sublevel hold? (1pt)
   \[ S = 2 \quad p = 6 \quad d = 10 \quad f = 14 \]

9. How many electrons can each orbital hold? (1pt)
   \[ 2 \]
10. The bright-line spectra for four elements and a mixture of elements are shown in the diagram below. Which element(s) is/are present in the mixture? (1pt)

![Bright-Line Spectra Diagram]

11. Given the following neutral elements, use the periodic table to... (3pts each)
- Draw box diagrams for each element
- Write the longhand electron configuration for each
- State how many total & unpaired electrons are present
- Circle the valence electrons.

a) Na

Total electrons: 11  
Unpaired electrons: 1

Longhand electron configuration: \(1s^2 \ 2s^2 \ 2p^6 \ 3s^1\)

b) Mg

Total electrons: 12  
Unpaired electrons: 0

Longhand electron configuration: \(1s^2 \ 2s^2 \ 2p^6 \ 3s^2\)
c) Al

Total electrons: 13
Unpaired electrons: 1

Longhand electron configuration: \[1s^2 2s^2 2p^6 3s^2 3p^1\]

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d) Si

Total electrons: 14
Unpaired electrons: 2

Longhand electron configuration: \[1s^2 2s^2 2p^6 3s^2 3p^2\]

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e) P

Total electrons: 15
Unpaired electrons: 3

Longhand electron configuration: \[1s^2 2s^2 2p^6 3s^2 3p^3\]
### HW 6.13 Types of Matter

#### Part 1: Fill in the blank. (5.5pts)

**Word bank:** Words may be used once, twice, or not at all. You might need to change the word from singular to plural to make sentence grammatically correct.

<table>
<thead>
<tr>
<th>atom</th>
<th>compound</th>
<th>homogeneous property</th>
<th>heterogeneous molecule</th>
</tr>
</thead>
<tbody>
<tr>
<td>element</td>
<td>diatomic</td>
<td>physical property</td>
<td>chemical molecule</td>
</tr>
<tr>
<td>proton</td>
<td>electron</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A(n) **compound** is made of two or more kinds of **elements**, which are each composed of only one kind of **atom**. Elements are defined by the number of **protons** present in their nucleus. Oxygen (O₂) is a(n) **element/molecule** but not a(n) **compound**. Glucose (C₆H₁₂O₆) is both a **molecule** and a(n) **compound**. Atoms cannot be separated by **chemical** means, while compounds can be separated by **chemical** means. A solution is a **homogeneous** mixture.

#### Part 2: Classify.

For each description, classify the matter (element, compound, homogeneous mixture, heterogeneous mixture). (5 pts)

1. Li(s) **element**
2. carbonated water **heterogeneous mixture**
3. brass **homogeneous mixture**
4. C₆H₁₂O₆ (aq) **homogeneous mixture**
5. green veggie juice **heterogeneous mixture**
6. F₂ **element**
7. NaNO₃ - compound
8. Bag of M&M's - heterogeneous mixture
9. oleic acid (C₁₈H₃₄O₂) - compound
10. 10% bleach - homogeneous mixture.

For each particle diagram, describe the type of matter present. (8pts)

1. heterogeneous mix of compound and element
2. compound / pure substance
3. homogeneous mix of 2 diatomic gaseous elements
4. homogeneous mix, solid state
5. element, solid state
6. heterogeneous mix of 2 liquid elements
7. element (diatomic), gaseous state / pure substance
8. element / pure substance