Periodic Properties

1. Using the scale bar and measurements of all of the atoms above, make a list of the atomic radius for each element listed in the mini-periodic table below.

<table>
<thead>
<tr>
<th>H</th>
<th>He</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li</td>
<td>Be</td>
</tr>
<tr>
<td>Na</td>
<td>Mg</td>
</tr>
</tbody>
</table>

See instructor for answers

2. Determine the radius of the 1s orbital for elements 1 through 6. What is the trend and why does it exist?

See instructor for answer

3. Look at the sodium atom. Which electrons (in the electron configuration) are called core electrons and which electrons are called valence electrons?

\[
\begin{array}{c}
\text{Core} \\
\text{Valence}
\end{array}
\]

4. Write full electron configurations for the following atoms in the ground state.

A. Si \(1s^2 2s^2 2p^6 3s^2 3p^2\)
B. Mo \(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 5p^4 4d^{10} 5d^5\)
C. Kr \(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6\)

5. Write abbreviated electron configurations (using a noble gas core) for the following atoms in the ground state.

A. Mg \([\text{Ne}] 3s^2\)
B. Cu \([\text{Ar}] 4s^\text{\textbullet} 3d^{10}\)
C. Re \([\text{Xe}] 6s^2 5f^1 4f^{14} 5d^{10}\)
6. Draw the orbital diagram for the chromium atom. Is a chromium atom paramagnetic or diamagnetic?

Cr atom: [Ar] 4s\(^2\) 3d\(^5\)

[Ar] paramagnetic

5A. Draw the orbital diagram for the zinc atom. Is a zinc atom paramagnetic or diamagnetic?

Zn atom:

\[\text{[Ar]}\]

7. Write abbreviated electron configurations for the following atoms and ions in the ground state.

A. Ca

[Ar] 4s\(^2\)

Ca\(^{2+}\) [Ar]

B. Ga

[Ar] 4s\(^2\) 3d\(^10\) 4p\(^3\)

Ga\(^{3+}\) [Ar] 4s\(^2\) 3d\(^{10}\)

C. Cr

[Ar] 4s\(^2\) 3d\(^5\)

Cr\(^{2+}\) [Ar] 3d\(^{14}\)

D. P

[Ne] 3s\(^2\) 3p\(^3\)

[Ar]

8. Using ONLY an ordinary periodic table:

A. Put the following in order of INCREASING radius:

1. Al
2. Cl
3. P
4. Ar

1 = biggest

B. Put the following in order of INCREASING radius:

1. As\(^{3+}\)
2. Kr
3. Sr\(^{2+}\)
4. Br

1 = biggest