Multiple Choice Questions

1. The first five ionization energies, in kJ/mol, for a particular element are shown below.

<table>
<thead>
<tr>
<th>I_1</th>
<th>I_2</th>
<th>I_3</th>
<th>I_4</th>
<th>I_5</th>
</tr>
</thead>
<tbody>
<tr>
<td>786</td>
<td>1577</td>
<td>3232</td>
<td>4356</td>
<td>16,091</td>
</tr>
</tbody>
</table>

The element is likely to form ionic compounds in which its charge is

A) 1+
B) 2+
C) 3+
D) 4+
E) 5+

2. Which list of elements is arranged in order of increasing atomic size (largest last)?

A) Be, Mg, Ca, Sr, Ba
B) Ba, Sr, Ca, Mg, Be
C) Be, Ca, Ba, Mg, Sr
D) Be, Ba, Ca, Mg, Sr
E) Ba, Sr, Ca, Be, Mg

3. Which atom in the ground state is paramagnetic?

A) He
B) Be
C) Ba
D) C
E) Ne

4. Which sequence is arranged in order of increasing ionization energies, lowest to highest?

A) Be, B, C, N, O
B) B, Be, C, O, N
C) Be, B, C, O, N
D) B, Be, C, N, O
E) O, N, C, B, Be
5. Which is not true of nonmetals?
   A) Most of their oxides are acidic.
   B) They are poor conductors of heat.
   C) They are poor conductors of electricity.
   D) Most tend to lose electron readily.
   E) Many are gases at room temperature.

The following responses are to be used to answer questions 6-10. Use an answer once, more than once or not at all.

A. Mg & Al
B. As & Se
C. Cl & F
D. Cr & Mo
E. Cu & Ag

6. Show a reversal in the trend for first ionization energy because of electron-electron repulsion. **B** Miniscule fact to know

7. Show a reversal in the trend for first ionization energy because of screening by full orbitals. **A** Fact to know

8. Show a reversal in the trend for electron affinity because of electron-electron repulsion. **C** Fact to know

9. Exhibit an anomaly in outer electron configuration because full d orbitals are especially stable. **E** Fact to know

10. Exhibit an anomaly in outer electron configuration because half full d orbitals are especially stable. **D** Fact to know

**Free Response Questions**

1. Use details of the modern atomic theory and periodicity to explain why:
   a. atomic radii become larger as the atomic number within a family gets larger.
   b. atomic radii become smaller as the atomic number within a period gets larger.
   c. the radius of an oxide ion is larger than the radius of an oxygen atom.