Name:

Ionization Energy, Trends, and valence electron exercise Worksheet

1. Briefly explain why barium has a lower first ionization energy than calcium.

2. Given the following elements and their electron configuration. Which element will have the lowest first ionization energy? Why?
   - Element A $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
   - Element B $1s^2 2s^2 2p^6 3s^2 3p^5$
   - Element C $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
   - Element D $1s^2 2s^2 2p^6 3s^2 3p^6$

3. The first four ionization energies (IE) for the element aluminum are as follows:
   IE1 = 577 kJ/mol
   IE2 = 1 817 kJ/mol
   IE3 = 2 745 kJ/mol
   IE4 = 11 580 kJ/mol.

How many valence electrons does aluminum have.

4. An atom has the following successive ionization energy levels:

   IE1 = 737 kJ/mol
   IE2 = 1 450 kJ/mol
   IE3 = 7 731 kJ/mol
   IE4 = 10 545 kJ/mol
   IE5 = 13 627 kJ/mol

How many valence electrons does this element have? Explain.

5. Which of these elements would have the highest value for the second ionization energy? Why?
   a. K b. Si c. Ar d. Br

6. Which of the following has the largest atomic radius and which has the smallest? Explain.
   - nitrogen
   - b.antimony
   - c.arsenic

7. Arrange the following from largest to smallest. Explain the order. Ne, Mg^{2+}, F^-, Na^+, O^{2-}