

Name _____

5-3 Review and Reinforcement

Periodic Trends

Use the periodic table and your knowledge of periodic trends to answer the following questions.

Which atom in each pair has the larger atomic radius?

- K 1. Li or K
- Ca 2. Ca or Ni
- Ga 3. Ga or B
- C 4. O or C
- Br 5. Cl or Br
- Ba 6. Be or Ba
- Si 7. Si or S
- Au 8. Fe or Au

Which ion in each pair has the smaller atomic radius?

- K⁺ 9. K⁺ or O²⁻
- Ba²⁺ 10. Ba²⁺ or I⁻
- Al³⁺ 11. Al³⁺ or P³⁻
- K⁺ 12. K⁺ or Cs⁺
- Fe³⁺ 13. Fe²⁺ or Fe³⁺
- F⁻ 14. F⁻ or S²⁻

Which atom or ion in each pair has the larger ionization energy?

- O 15. Na or O
- Be 16. Be or Ba
- F 17. Ar or F
- Cu 18. Cu or Ra
- Ne 19. I or Ne
- V 20. K or V
- Ca 21. Ca or Fr
- Se 22. W or Se

Write the charge that each of the following atoms will acquire when it has a complete set of valence electrons.

2- 23. O

1+ 24. Na

1- 25. F

3- 26. N

2+ 27. Ca

0 28. Ar

29. Define *atomic radius*.

The distance from the center of the atom to the outermost electron.

30. Why do atoms get smaller as you move across a period?

Increasing nuclear charge exerts a stronger pull on the electrons, thus shrinking their orbitals.

31. Explain the relationship between the relative size of an ion to its atom and the charge on the ion.

Cation: Smaller than the atom.

Anion: Larger than the atom.

32. Contrast ionization energy and electron affinity. In general, what can you say about these values for metals and nonmetals?

Ionization Energy: The energy required to remove an electron from the atom.

Electron Affinity: The energy change when an atom gains an electron.

Metals have lower ionization energy and electron affinity than non-metals.

33. Why is there such a large jump in ionization energy between the second and third ionization energies for magnesium?

The third ionization energy represents the energy needed to remove one of Magnesium's core electrons.

34. Explain why noble gases are inert and do not form ions.

They have a full set of valence electrons, therefore, there is no need to gain or lose electrons.

35. Define the term electronegativity. What is the periodic trend for electronegativity?

The ability to attract electrons in a chemical bond. Increases from left to right and bottom to top.

- Chlorine, selenium, and bromine are located near each other on the periodic table. Which of these elements is (a) the smallest atom? (b) the atom with the highest ionization energy?
a) Cl b) Cl
- Phosphorus, sulfur, and selenium are located near each other on the periodic table. Which of these elements is (a) the largest atom? (b) the atom with the highest ionization energy?
a) Se b) S
- Scandium, yttrium, and lanthanum are located near each other in the periodic table. Which of these elements is (a) the largest atom? (b) the atom with the smallest ionization energy?
a) La b) La
- (a) Which of the following atoms is smallest: vanadium, chromium, or tungsten? (b) Which of these atoms has the highest ionization energy?
a) Cr b) Cr
- (a) Which of the following atoms is smallest: nitrogen, phosphorus, or arsenic? (b) Which of these atoms has the smallest ionization energy?
a) N b) As
- Which of the following is the largest: a potassium atom, a potassium ion with a charge of $1+$, or a rubidium atom?
Rb atom
- Which of the following is the largest: a chlorine atom, a chlorine ion with a charge of $1-$, or a bromine atom?
Chlorine ion
- Which of the following is the smallest: a lithium atom, a lithium ion with a charge of $1+$, or a sodium atom?
Lithium ion
- Which of the following is the largest: a tellurium ion with a charge of $2-$, an iodine ion with charge of $1-$, or a xenon atom?
Tellurium ion
- Aluminum, silicon, and phosphorus are located near each other in the periodic table. Which of these elements is (a) the largest atom? (b) the atom with the highest ionization energy?
a) Al b) P