

Honors Chemistry Ch 5 Periodic Trends test

take ? is
from SLO
pre-test
first

Matching

Match each item with the correct statement below.

- | | |
|----------------------|-----------------|
| a. group | d. metal |
| b. ionization energy | e. periodic law |
| c. atomic radius | |

- A 1. vertical column in the periodic table
- E 2. A repetition of properties occurs when elements are arranged in order of increasing atomic number.
- D 3. type of element that is a good conductor of heat and electric current
- C 4. one-half the distance between the nuclei of two atoms when the atoms are joined; size of the atom
- B 5. energy required to remove an electron from an atom

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- B 6. Which of the following elements is in the same period as phosphorus?
- | | |
|--------------|-------------|
| a. carbon | c. nitrogen |
| b. magnesium | d. oxygen |
- C 7. Which of the following categories includes the majority of the elements?
- | | |
|---------------|--------------|
| a. metalloids | c. metals |
| b. liquids | d. nonmetals |
- D 8. Of the elements Pt, V, Li, and Kr, which is a nonmetal?
- | | |
|-------|-------|
| a. Pt | c. Li |
| b. V | d. Kr |

- A 9. In which of the following sets is the symbol of the element, the number of protons, and the number of electrons given correctly?
- a. In, 49 protons, 49 electrons
 - b. Zn, 30 protons, 60 electrons
 - c. Cs, 55 protons, 132.9 electrons
 - d. F, 19 protons, 19 electrons

- C 10. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^4$?
- a. nitrogen
 - b. selenium
 - c. silicon
 - d. silver

- A 11. Which of the following is true about the electron configurations of the noble gases?
- a. The highest occupied s and p sublevels are completely filled.
 - b. The highest occupied s and p sublevels are partially filled.
 - c. The electrons with the highest energy are in a d sublevel.
 - d. The electrons with the highest energy are in an f sublevel.

- A/B 12. *Bad question* Which subatomic particle plays the greatest part in determining the properties of an element?
- a. proton
 - b. electron
 - c. neutron
 - d. none of the above

- B 13. Which of the following elements is a main transition metal?
- a. cesium
 - b. copper
 - c. tellurium
 - d. tin

- A 14. What is another name for Group 1A?
- a. alkali metals
 - b. alkaline earth metals
 - c. noble gases
 - d. halogens

- D 15. Of the elements Fe, Sn, U, and Br, which is a halogen?
- a. Fe
 - b. Sn
 - c. U
 - d. Br

- B 16. How does atomic radius change from top to bottom in a group in the periodic table?
- a. It tends to decrease.
 - b. It tends to increase.
 - c. It first increases, then decreases.
 - d. It first decreases, then increases.

- A 17. How does atomic radius change from left to right across a period in the periodic table?
- a. It tends to decrease.
 - b. It tends to increase.
 - c. It first increases, then decreases.
 - d. It first decreases, then increases.

- A 18. What causes the shielding effect to remain constant across a period?
- a. Electrons are added to the same principal energy level.
 - b. Electrons are added to different principal energy levels.
 - c. The charge on the nucleus is constant.
 - d. The atomic radius increases.

- B 19. What element in the second period has the largest atomic radius?
- a. carbon
 - b. lithium
 - c. ~~potassium~~
 - d. neon

- A 20. Which of the following factors contributes to the increase in atomic size within a group in the periodic table as the atomic number increases?
- a. more shielding of the electrons by the highest occupied energy level
 - b. an increase in size of the nucleus
 - c. an increase in number of protons
 - d. fewer electrons in the highest occupied energy level
- Revised?*

- A 21. What is the charge of a cation?
- a. a positive charge
 - b. no charge
 - c. a negative charge
 - d. The charge depends on the size of the nucleus.

- B 22. Which of the following statements is true about ions?
- a. Cations form when an atom gains electrons.
 - b. Cations form when an atom loses electrons.
 - c. Anions form when an atom gains protons.
 - d. Anions form when an atom loses protons.

- D 23. The metals in Groups 1A, 2A, and 3A ____.
- a. gain electrons when they form ions
 - b. all form ions with a negative charge
 - c. all have ions with a 1^+ charge
 - d. lose electrons when they form ions

- D 24. Which of the following statements is NOT true about ions?
- a. Cations are positively charged ions.
 - b. Anions are common among nonmetals.
 - c. Charges for ions are written as numbers followed by a plus or minus sign.
 - d. When a cation forms, more electrons are transferred to it.

- B 25. In which of the following sets are the charges given correctly for all the ions?
- a. ~~Na⁺, Mg⁺, Al⁺~~
 - b. K⁺, Sr²⁺, O²⁻
 - c. ~~Rb⁻, Ba²⁻, P³⁺~~
 - d. ~~N⁻, O²⁻, F³⁻~~

- D 26. What is the element with the highest electronegativity value?
- a. cesium
 - b. helium
 - c. calcium
 - d. fluorine

- C 27. Which of the following elements has the smallest ionic radius?
- a. Li
 - b. K
 - c. O
 - d. S

- A 28. Which of the following factors contributes to the decrease in ionization energy within a group in the periodic table as the atomic number increases?
- a. increase in atomic size
 - b. increase in size of the nucleus
 - c. increase in number of protons
 - d. fewer electrons in the highest occupied energy level

- C 29. Which of the following elements has the smallest first ionization energy?
- a. sodium
 - b. calcium
 - c. potassium
 - d. magnesium

Na Mg
(K) Ca

- D 30. Which statement is true about electronegativity?
- Electronegativity is the ability of an anion to attract another anion.
 - Electronegativity generally increases as you move from top to bottom within a group.
 - Electronegativity generally is higher for metals than for nonmetals.
 - Electronegativity generally increases from left to right across a period.

- A 31. As you move from left to right across the second period of the periodic table ____.
- ionization energy increases
 - atomic radii increase
 - electronegativity decreases
 - atomic mass decreases

- C 32. Of the following elements, which one has the smallest first ionization energy?
- boron
 - carbon
 - aluminum
 - Silicon

B C
Al Si

33. What is the general trend in atomic radii across a period? Why?

Decreases across

increasing nuclear charge (more protons pull the electrons in closer)

34. What is the general trend in atomic radii down a group? Why?

Atomic radii increases down the group because energy levels are being added, increasing the distance from the nucleus.

35. What is ionization energy? How does ionization energy influence the type of ion that an element typically forms?

The energy required to remove an electron from an atom.

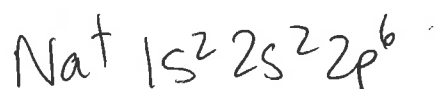
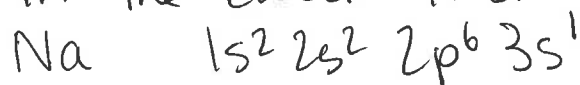
High ionization energy means an atom is more likely to form an anion (gain an e^-)

Energy likely is more likely (lose an e^-)
Low ionization means an atom is more likely to form a cation

36. What trend is observed between the size of an atom and the size of the atom's cation? Why?
Show the electron configuration for a neutral atom and its cation:

The ion is smaller than the atom.

There are less electrons, ~~the~~ less repulsions in the cloud. It shrinks



37. What trend is observed between the size of an atom and the size of the atom's anion? Why?
Show the electron configuration for a neutral atom and its anion:

The ion is larger than the atom.

There are more electrons, more repulsions in the cloud. It ~~grows~~ gets larger.

