

## Periodic Trends (Homework)

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1.

Though all the elements in a given period (horizontal row) of the periodic table have their valence electrons in the same type of orbitals, the sizes of the atoms decrease from left to right within a period. Select the reasons that explain why.

2.

In each of the following sets of elements, which element would be expected to have the highest ionization energy?

- (a) Cs, K, Li
- (b) Ba, Sr, Ca
- (c) I, Br, Cl
- (d) Te, Si, S

3.

Arrange the following sets of elements in order of increasing atomic size.

- (a) Na, Li, K, Rb
- (b) Sb, N, P, As
- (c) Al, Tl, B, In

4.

In each of the following sets of elements, which element would be expected to have the smallest atomic size.

- (a) Li, K, Rb
- (b) Na, Si, S
- (c) N, P, Sb
- (d) C, O, F

5.

For each of the following sets of elements, arrange the elements in order of increasing electronegativity.

- (a) Y, In, Sr
- (b) Sb, P, Bi
- (c) Cl, Na, Al

6.

For each of the given elements, select two other elements with similar chemical properties.

- (a) iodine (I)
- (b) barium (Ba)
- (c) iron (Fe)

7.

An unknown element has chemical behavior similar to that of silicon (Si) and lead (Pb). The unknown element has a mass greater than that of sulfur (S), but less than that of cadmium (Cd). Use the periodic table to determine the identity of the unknown element.

8.

What are the symbols for the elements with the following valence electron configurations? (Select all that apply.)

- (a)  $s^2d^1$
- (b)  $s^2p^3$
- (c)  $s^2p^6$

9.

Describe how each of the following are related.

- (a) group number and number of valence electrons for representative elements
- (b) principal energy level of valence electrons and period number

10.

A gaseous element is a poor conductor of heat and electricity, and is extremely nonreactive. Is the element likely to be a metal, nonmetal, or metalloid?

Where would the element be located on the periodic table?

Explain.

11.

Which has the largest radius: magnesium (Mg), silicon (Si), sulfur (S), or sodium (Na)?

Which has the smallest radius?

12.

Which has the largest radius: helium (He), xenon (Xe), or argon (Ar)?

Which has the smallest radius?

13.

Of the elements magnesium, calcium, and barium, which forms the ion with the largest radius?

Of the elements magnesium, calcium, and barium, which forms the ion with the smallest radius?

What periodic trend explains this? (6.3)

14.

Which group has the highest ionization energies?

Explain why. (6.3)

15.

How does the ionic radius of a nonmetal compare with its atomic radius?

Explain why the change in radius occurs. (6.3)