

Periodic Table WS

Name: Weiss - Key

- A 1) Which list of elements contains a metal, a metalloid, and a nonmetal?
 (A) Cd, Sb, I (C) Si, Ge, Sn
 (B) F, Cl, Br (D) Zn, Ga, Ge
- C 2) Which element is malleable and conducts electricity? *Metal!*
 (A) sulfur (C) iron
 (B) phosphorus (D) iodine
- C 3) Which list consists of elements that have the *most* similar chemical properties? *same group*
 (A) K, Ca, and Ga (C) Mg, Ca, and Ba
 (B) Mg, Al, and Si (D) K, Al, and Ni
- C 4) What is a property of most metals?
 (A) They tend to gain electrons easily when bonding. *MM*
 (B) They are poor conductors of electricity. *MM*
 (C) They tend to lose electrons easily when bonding.
 (D) They are poor conductors of heat. *MM*
- A 5) Antimony is classified as a *Sb*
 (A) metalloid (B) metal (C) nonmetal (D) noble gas
- B 6) In which shell are the valence electrons of the elements in Period 2 found?
 (A) 1 (B) 2 (C) 3 (D) 4
- C 7) Which element is classified as a noble gas at STP? *Group 18*
 (A) oxygen (B) hydrogen (C) neon (D) nitrogen
- C 8) The elements in Period 5 on the Periodic Table are arranged from left to right in order of
 (A) decreasing atomic mass (C) increasing atomic number
 (B) increasing atomic mass (D) decreasing atomic number
not all
- B 9) Which list of elements contains two metalloids? *B, Si, As, Te*
 (A) Po, Sb, I, Xe (C) Si, P, S, Cl
 (B) Si, Ge, Po, Pb (D) As, Bi, Br, Kr
Ge, Sb
- D 10) Based on the *Properties of Selected Elements* chemistry reference table, which of the following atoms requires the least energy for the removal of the most loosely bound electron?
 (A) Sn *709* (B) Be *900* (C) Br *1140* (D) Sr *377*
- D 11) Which species does not have a noble gas electron configuration?
 (A) Ar *noble gas* (B) Na⁺ *like Ne* (C) Mg²⁺ *like Ne* (D) S *Not a Noble Gas!*
15

- 12) Which is a property of *most* nonmetallic solids?
 A) brittleness
 B) high electrical conductivity *Met*
 C) malleability *Met*
 D) high thermal conductivity *Met*
- 13) Compared to the radius of a chlorine atom, the radius of a chloride ion is
 A) larger because chlorine gains an electron
 B) smaller because chlorine loses an electron
 C) smaller because chlorine gains an electron
 D) larger because chlorine loses an electron
whenever electrons are gained, radius increases
- 14) Which of the following elements has the *highest* electronegativity?
 A) Al *1.5*
 B) Ca *1.0*
 C) H *2.2*
 D) K *0.8*
- 15) Which change occurs when a barium atom loses two electrons?
 A) It becomes a positive ion and its radius increases.
 B) It becomes a negative ion and its radius decreases.
 C) It becomes a negative ion and its radius increases.
 D) It becomes a positive ion and its radius decreases.
whenever electrons are lost, radius decreases
- 16) Which of the following ions has the *smallest* radius?
 A) K^+ *3*
 B) Rb^+ *4*
 C) Cl^- *3*
 D) F^- *2*
Furthest P.E.s
- 17) The element in Period 4 and Group 1 of the Periodic Table would be classified as a
 A) metal
 B) metalloid
 C) noble gas
 D) nonmetal
- 18) Which element has chemical properties that are *most* similar to the chemical properties of sodium?
 A) Mg
 B) K
 C) Se
 D) Cl
Na Group
- 19) What occurs when an atom loses an electron?
 A) The atom's radius decreases and the atom becomes a negative ion.
 B) The atom's radius increases and the atom becomes a negative ion.
 C) The atom's radius decreases and the atom becomes a positive ion.
 D) The atom's radius increases and the atom becomes a positive ion.
whenever electrons are lost, radius decreases
- 20) Which of the following Group 2 elements has the *lowest* first ionization energy?
 A) Ba *503*
 B) Ca *590*
 C) Be *900*
 D) Mg *738*
lowest is Ba

Periodic Table

Name: _____

- 1) As each successive element in Group 15 of the Periodic Table is considered in order of increasing atomic number, the atomic radius
- A) decreases B) increases C) remains the same
- 2) Which list of elements is arranged in order of increasing atomic radii?
- A) F, Cl, Br, I C) Li, Be, B, C
 B) Sc, Ti, V, Cr D) Sr, Ca, Mg, Be
- 3) From which of these atoms in the ground state can a valence electron be removed using the least amount of energy?
- A) carbon B) chlorine C) nitrogen D) oxygen
- 4) As the elements in Group 17 on the Periodic Table are considered from top to bottom, what happens to the atomic radius and the metallic character of each successive element?
- A) The atomic radius decreases and the metallic character increases.
 B) The atomic radius and the metallic character both increase.
 C) The atomic radius increases and the metallic character decreases.
 D) The atomic radius and the metallic character both decrease.
- 5) Element X is a solid that is brittle, lacks luster, and has six valence electrons. In which group on the Periodic Table would element X be found?
- A) 1 B) 2 C) 15 D) 16
- 6) At standard pressure, which element has a melting point higher than standard temperature?
- A) F₂ B) Br₂ C) Fe D) Hg
- 7) Which is a property of most nonmetallic solids?
- A) malleability C) high thermal conductivity
 B) brittleness D) high electrical conductivity
- 8) Which element is malleable and can conduct electricity in the solid phase?
- A) tin C) phosphorus
 B) iodine D) sulfur
- 9) Which statement correctly describes diamond and graphite, which are different forms of solid carbon?
- A) They differ in their molecular structure and properties.
 B) They do not differ in their molecular structure or properties.
 C) They differ in their properties, only.
 D) They differ in their molecular structure, only.
- 10) The elements located in the lower left corner of the Periodic Table are classified as
- A) metalloids C) nonmetals
 B) noble gases D) metals
- 11) As the elements in Period 2 of the Periodic Table are considered in succession from left to right, there is a decrease in atomic radius with increasing atomic number. This may best be explained by the fact that the
- A) number of protons increases, and the number of shells of electrons increases
 B) number of protons increases, and the number of shells of electrons remains the same
 C) number of protons decreases, and the number of shells of electrons remains the same
 D) number of protons decreases, and the number of shells of electrons increases
- 12) The high electrical conductivity of metals is primarily due to
- A) high electronegativities C) mobile electrons
 B) high ionization energies D) filled energy levels

13) As the atoms of the Group 17 elements in the ground state are considered from top to bottom, each successive element has

- ↑ valence electrons ↓
- (A) the same number of valence electrons and similar chemical properties
 B) an increasing number of valence electrons and similar chemical properties
 C) an increasing number of valence electrons and identical chemical properties
 D) the same number of valence electrons and identical chemical properties

14) Which of the following Group 15 elements has the greatest metallic character?

- A) nitrogen N
 B) antimony Sb
 C) phosphorus P
 (D) bismuth Bi

15) Which trends are observed when the elements in Period 3 on the Periodic Table are considered in order of increasing atomic number?

- A) The atomic radius increases, and the first ionization energy generally decreases.
 B) The atomic radius decreases, and the first ionization energy generally decreases.
 C) The atomic radius decreases, and the first ionization energy generally increases.
 D) The atomic radius increases, and the first ionization energy generally increases.

16) The strength of an atom's attraction for the electrons in a chemical bond is the atom's

- A) ionization energy
 B) electronegativity
 C) heat of reaction
 D) heat of formation

17) The amount of energy required to remove the outermost electron from a gaseous atom in the ground state is known as

- A) first ionization energy
 B) activation energy
 C) conductivity
 D) electronegativity

18) Explain, in terms of atomic structure, why the atomic radius of iodine is greater than the atomic radius of fluorine.

atoms of I have more occupied shells than atoms of F

19) The table below shows the electronegativity of selected elements of Period 2 of the Periodic Table.

Element	Atomic Number	Electronegativity
Beryllium	4	1.6
Boron	5	2.0
Carbon	6	2.6
Fluorine	9	4.0
Lithium	3	1.0
Oxygen	8	3.4

3 1.0
 4 1.6
 5 2.0
 6 2.6
 8 3.4
 9 4.0

For the elements in the table, state the trend in electronegativity in terms of atomic number.

as atomic # increases, EN values increase.

20) Potassium ions are essential to human health. The movement of dissolved potassium ions, $K^+(aq)$, in and out of a nerve cell allows that cell to transmit an electrical impulse.

Explain, in terms of atomic structure, why a potassium ion is smaller than a potassium atom.

2-8-8

18

whenever electrons are lost, the radius decreases. (K⁺ 3 PELs, K 4 PELs)

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Period

Periodic Table Review

For questions 1-13, fill in the blanks with the proper terms.

1. Elements of Group 1 are called alkali metals (not hydrogen, a non-metal).
2. Elements of Group 2 are called alkaline earth metals.
3. Elements of Group 3-12 are called transition metals.
4. As you go from left to right across the periodic table, the elements go from metals (metals/nonmetals) to nonmetals (metals/nonmetals).
5. Group 18 elements are called the noble gases.
6. Elements within a group have a similar number of valence electrons.
7. Elements across a period have the same number of occupied Principle Energy Levels.
8. A colored ion generally indicates a transition metal.
9. What sublevels are filling across the transition metals? d sublevels.
10. An element with both metallic and nonmetallic properties is called a metalloid.
11. The ability of an atom to attract electrons toward itself is known as electronegativity.
This quantity is based on the fluorine scale and generally decreases as you go down a group on the Periodic Table.
12. The distance from the nucleus to the outermost occupied energy level is called the atomic radius. This quantity generally increases as you go down a group and decreases as you go across a period.
13. The energy required to remove an electron from an atom is known as the ionization energy energy. This quantity generally decreases as you move down a group on the Periodic Table.

Answer the following questions in your own words and using complete sentences.

14. Magnesium has an atomic radius of 140 pm while strontium has an atomic radius of 190 pm.

Explain why strontium has a larger atomic radius than magnesium.

Atoms of Strontium have more occupied PELs than atoms of Magnesium

15. Potassium has ionization energy of 419 kJ/mol while cesium has an ionization energy of 376 kJ/mol. Explain the reasoning behind this difference in ionization energy values.

Atoms of Cesium have more occupied PELs than atoms of Potassium. With more PELs, there are more shielding effects so less energy is needed to remove an electron from Cs than from K.

Given the following groups of elements, answer the following questions:

14) F Cl Br I

- a) Lowest electronegativity? I
- b) Highest electronegativity? F
- c) Highest ionization energy? F
- d) Largest atomic radius? I
- e) Which are non-metals? all of them
- f) Highest shielding effect? I (most PELs)
- g) List them in order from largest to smallest. I, Br, Cl, F
- h) Would they gain or lose electrons to form ions? gain 1
- i) What charge would the ion have? -1
- j) Would these ions be considered anions or cations? anions (negative charge)
- k) What is this group of elements called? halogens
- l) Which are solids at STP? I₂
- m) Which are liquids at STP? Br₂
- n) Which are gases at STP? F₂, Cl₂
- l) List two properties of these types of elements.

F
Cl
Br
I

more PELs
radius inc
Electronegativity dec.
First Ion. Energy dec.

Gain electrons easily when bonding/ reacting
form ions with a -1 charge

15) Al Si P S

- a) Largest atomic radius? Al
- b) Greatest nuclear charge? S
- c) Element from the group that forms ions with a -3 charge P
- d) Element from the group that forms ions with a -4 charge Si
- e) Which are metalloids? Si
- f) Which are non-metals? P, S
- g) Which are metals? Al

more protons (stronger nucleus)

Al Si P S

radius dec.
electronegativity inc.
first ionization energy inc.