

Name _____

Topic 2 - The Periodic Table

____ 1. As the elements Li to F in Period 2 of the Periodic Table are considered in succession, how do the relative electronegativity and the atomic radius of each atom compare?

- 1) The relative electronegativity increases and the atomic radius decreases
- 2) The relative electronegativity increases and the atomic radius increases
- 3) The relative electronegativity decreases and the atomic radius decreases
- 4) The relative electronegativity decreases and the atomic radius increases

____ 2. Which of the following statements *best* explains why Na is *not* found in nature?

- 1) Na is very unreactive, and it forms stable compounds
- 2) Na is very reactive, and it forms stable compounds
- 3) Na is very unreactive, and it forms unstable compounds
- 4) Na is very reactive, and it forms unstable compounds

____ 3. Which element is an active nonmetal?

- 1) oxygen
- 2) neon
- 3) chromium
- 4) zinc

____ 4. Atoms of elements in a group on the periodic table have similar chemical properties. This similarity is *most* closely related to the atoms'

- 1) number of principal energy levels
- 2) atomic numbers
- 3) atomic masses
- 4) number of valence electrons

____ 5. At which location in the Periodic Table would the *most* active metallic element be found?

- 1) in Group 1 at the top
- 2) in Group 1 at the bottom
- 3) in Group 17 at the top
- 4) in Group 17 at the bottom

____ 6. On the Periodic Table, an element classified as a semimetal(metalloid) can be found in

- 1) Period 3, Group 16
- 2) Period 6, Group 15
- 3) Period 2, Group 14
- 4) Period 4, Group 15

____ 7. Which element can react with fluorine to form more than one binary compound?

- 1) K
- 2) Na
- 3) Mg
- 4) Co

____ 8. Which atom will lose an electron *most* readily?

- 1) potassium
- 2) strontium
- 3) cesium
- 4) calcium

____ 9. Compared to the atomic radius of a sodium atom, the atomic radius of a magnesium atom is smaller. The smaller radius is primarily a result of the magnesium atom having

- 1) fewer principal energy levels
- 2) a smaller nuclear charge
- 3) a larger nuclear charge
- 4) more principal energy levels

____ 10. A diatomic element with a high first ionization energy would most likely be a

- 1) nonmetal with a low electronegativity
- 2) nonmetal with a high electronegativity
- 3) metal with a high electronegativity
- 4) metal with a low electronegativity

____ 11. An atom of an element has 28 innermost electrons and 7 outermost electrons. In what period of the periodic table is this element located?

- 1) 5
- 2) 3
- 3) 4
- 4) 2

____ 12. Who was credited with creating the first periodic table that organized the elements according to atomic mass?

- 1) Dmitri Mendeleev
- 2) John Dalton
- 3) Henry Mosely
- 4) Ernest Rutherford

- ____ 13. At STP, potassium is classified as
1) a molecular solid 2) a metallic solid
3) a network solid 4) an ionic solid
- ____ 14. As the atoms in Group 16 are considered in order from top to bottom, the electronegativity of each successive element
1) remains the same
2) increases
3) decreases
- ____ 15. Elements in a given period of the Periodic Table contain the same number of
1) occupied principal energy levels
2) electrons in the outermost level
3) neutrons in the nucleus
4) protons in the nucleus
- ____ 16. Compared to a neon atom, a helium atom has a
1) smaller first ionization energy
2) smaller radius
3) greater number of electrons
4) larger atomic number
- ____ 17. Atoms of metallic elements tend to
1) lose electrons and form positive ions
2) gain electrons and form positive ions
3) lose electrons and form negative ions
4) gain electrons and form negative ions
- ____ 18. The pair of elements with the *most* similar chemical properties are
1) S and Ar
2) Mg and S
3) Ca and Br
4) Mg and Ca
- ____ 19. As the elements in Group 1 are considered in order of increasing atomic number, the atomic radius of each successive element increases. This is primarily due to an increase in the number of
1) neutrons in the nucleus
2) unpaired electrons
3) electrons in the outermost shell
4) principal energy levels
- ____ 20. Which of the following could be the first ionization energy, in kilojoules per mole of atoms, of a nonmetal?
1) 709 2) 589
3) 403 4) 1,251
- ____ 21. Which part of the Periodic Table contains elements with the *greatest* metallic properties?
1) lower right 2) lower left
3) upper right 4) upper left
- ____ 22. As a sulfur atom gains electrons, its radius
1) increases
2) decreases
3) remains the same
- ____ 23. Which type of energy is represented in the equation
 $\text{Na} + \text{energy} \rightarrow \text{Na}^+ + \text{e}^-$?
1) ionization energy
2) neutralization energy
3) formation energy
4) nuclear energy
- ____ 24. Which element in Group 17 is the *most* active nonmetal?
1) Cl 2) Br
3) F 4) I
- ____ 25. More than two thirds of the elements on the periodic table are classified as
1) metals 2) nonmetals
3) noble gases 4) metalloids
- ____ 26. Nonmetals in the solid state are poor conductors of heat tend to
1) have a shiny luster
2) be malleable
3) have a good electrical conductivity
4) be brittle
- ____ 27. Which sequence of elements is arranged in order of decreasing atomic radii?
1) Cl, Br, I
2) Al, Si, P
3) Li, Na, K
4) N, C, B

- _____ 28. As the elements in Group 16 are considered from top to bottom on the Periodic Table, the atomic radii
- 1) decrease and the ionization energies decrease
 - 2) increase and the ionization energies increase
 - 3) decrease and the ionization energies increase
 - 4) increase and the ionization energies decrease
- _____ 29. Which atom has the largest atomic radius?
- 1) Mg
 - 2) K
 - 3) Ca
 - 4) Na
- _____ 30. Which element in Period 3 has the *greatest* tendency to gain electrons?
- 1) Si
 - 2) Na
 - 3) Cl
 - 4) Ar
- _____ 31. As the elements are considered from top to bottom of Group 15, which sequence in properties occurs?
- 1) non metal --> metalloid --> metal
 - 2) metalloid --> metal --> nonmetal
 - 3) metal --> nonmetal --> metalloid
 - 4) metal --> metalloid --> non metal
- _____ 32. Which atom forms an ion that is larger than its atom?
- 1) Cl
 - 2) Li
 - 3) Mg
 - 4) Ca
- _____ 33. Which sequence of atomic numbers represents elements which have similar chemical properties?
- 1) 19, 23, 30, 46
 - 2) 3, 12, 21, 40
 - 3) 4, 20, 38, 88
 - 4) 9, 16, 33, 50
- _____ 34. An aqueous solution of XCl_2 contains colored ions. Element X is *most* likely
- 1) an alkaline earth metal
 - 2) an alkali metal
 - 3) a transition metal
 - 4) a halogen
- _____ 35. Low ionization energies are *most* characteristic of atoms that are
- 1) noble gases
 - 2) nonmetals
 - 3) metals
 - 4) metalloids
- _____ 36. The properties of silicon are characteristic of
- 1) a metal, only
 - 2) neither a metal nor a nonmetal
 - 3) a nonmetal, only
 - 4) both a metal and a nonmetal
- _____ 37. Which three groups of the Periodic Table contain the *most* elements classified as metalloids (semimetals)?
- 1) 2, 13, and 14
 - 2) 14, 15, and 16
 - 3) 1, 2, and 13
 - 4) 16, 17, and 18
- _____ 38. Which substance is the best conductor of electricity?
- 1) $NaCl_{(s)}$
 - 2) $Br_{2(l)}$
 - 3) $Cu_{(s)}$
 - 4) $H_2O_{(l)}$
- _____ 39. What are two properties of most nonmetals?
- 1) high ionization energy and good electrical conductivity
 - 2) low ionization energy and good electrical conductivity
 - 3) low ionization energy and poor electrical conductivity
 - 4) high ionization energy and poor electrical conductivity
- _____ 40. In the modern Periodic Table, elements are arranged according to
- 1) mass number
 - 2) atomic number
 - 3) atomic mass
 - 4) oxidation number
- _____ 41. As the atoms of the metals of Group 1 in the ground state are considered from top to bottom, the number of occupied energy levels
- 1) increases
 - 2) decreases
 - 3) remains the same
- _____ 42. What group on the periodic table contains noble gases?
- 1) 1
 - 2) 2
 - 3) 17
 - 4) 18

43. An atom of an element contains 20 protons, 20 neutrons, and 20 electrons. This element is

- 1) a halogen
- 2) a noble gas
- 3) an alkali metal
- 4) an alkaline earth metal

44. Which element is considered malleable?

- 1) radon
- 2) gold
- 3) hydrogen
- 4) sulfur

45. Which element is in Group 2 and Period 7 of the Periodic Table?

- 1) manganese
- 2) radium
- 3) radon
- 4) magnesium

46. As elements in Group 2 of the Periodic Table are considered from top to bottom, the chemical reactivity of each succeeding element generally

- 1) increases
- 2) remains the same
- 3) decreases

47. An element that has a high ionization energy and tends to be chemically inactive would *most* likely be

- 1) a transition element
- 2) a halogen
- 3) a noble gas
- 4) an alkali metal

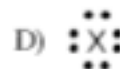
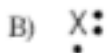
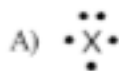
48. The table below shows some properties of A, B, C, and D.

element	Ionization Energy	Electro-negativity	Conductivity of heat and electricity
A	low	low	low
B	low	low	high
C	high	high	low
D	high	high	high

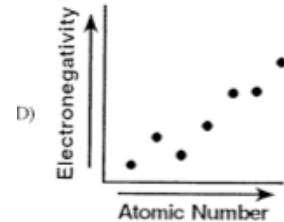
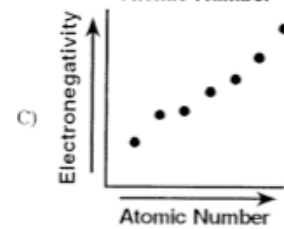
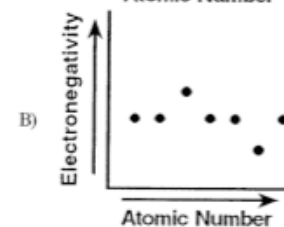
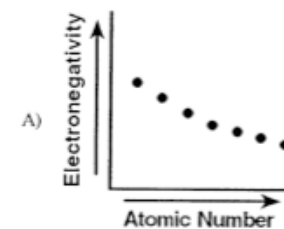
Which element is *most* likely a nonmetal?

- 1) A
- 2) B
- 3) C
- 4) D

49. Which electron dot symbol could represent a noble gas?



50. Which diagram correctly shows the relationship between electronegativity and atomic number for the elements of Period 3?



Constructed Response Questions

1. Name *two* properties of nonmetals that make them unsuitable for use in electrical wiring. Explain why each of these properties makes them unsuitable.

2. An atom has the following electron configuration: 2-8-18-7

a. State the group AND period this element is found on the Periodic Table

b. Identify this element _____

c. Classify this element as a metal, nonmetal or metalloid

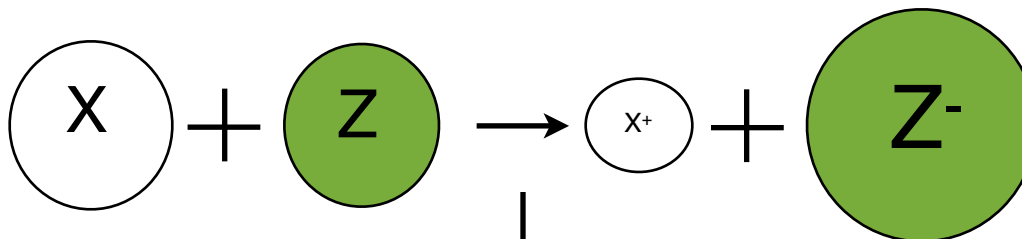
d. In the box below, draw a Lewis-electron dot structure for this element



e. List *two* other elements likely to have properties similar to this element.

3. Sodium and cesium are both elements in Group 1. They have the same number of valence electrons and similar chemical properties. For example, they both explode in water. However, cesium reacts more violently in water than sodium. Explain why cesium is more reactive than sodium.

4. The diagram below represents atoms of two unknown elements (X and Z) undergoing a reaction.

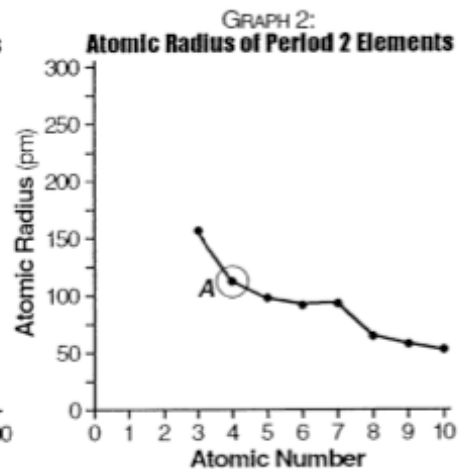
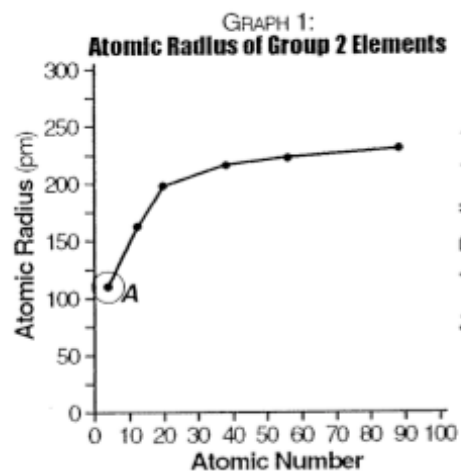


a. Which particle (X or Z) most likely represents a metal atom? [Give one reason to support your answer.]

b. Which particle (X or Z) most likely represents a nonmetal atom? [Give one reason to support your answer.]

Questions 5 and 6 refer to the following:

The graphs below represent the atomic radius of the elements in Group 2 and Period 2.



5. According to graph 1, what is the trend in atomic radius in group 2 with increasing atomic number? Give one reason to account for this trend

6. According to graph 2, what is the trend in atomic radius in Period 2 with increasing atomic number? Give one reason to account for this trend.

Next Page

Questions 7 through 14 refer to the following:

The diagram below represents the *Periodic Table of Elements*. Selected elements are represented by the letters A through E.

1																	18	
	2												13	14	15	16	17	
			3	4	5	6	7	8	9	10	11	12		C			D	
	A								B									E

7. Which element is the *most* reactive metal?

8. Which element is the *most* reactive nonmetal?

9. Which element has properties of *both* metals and nonmetals?

10. Which *two* elements would most likely combine to form an ionic compound?

11. Which element exists as a monoatomic gas at STP?

12. Which element exists as a diatomic gas at STP?

13. Write the electron configuration of element C.

14. Compare element A and element D in terms of the following physical properties:

a. malleability

b. electrical conductivity

c. density