Chemistry, 11e (Brown/LeMay\Bursten\Murphy)
Chapter 7: Periodic Properties of the Elements

7.1 Multiple-Choice and Bimodal Questions

1) _____ is credited with developing the concept of atomic numbers.

A) Dmitri Mendeleev
B) Lothar Meyer
C) Henry Moseley
D) Ernest Rutherford
E) Michael Faraday

2) Elements in the modern version of the periodic table are arranged in order of increasing _____.

A) oxidation number
B) atomic mass
C) average atomic mass
D) atomic number
E) number of isotopes

3) An electron in a(n) _____ subshell experiences the greatest effective nuclear charge in a many-electron atom.

A) 3f
B) 3p
C) 3d
D) 3s
E) 4s

4) A tin atom has 50 electrons. Electrons in the _____ subshell experience the lowest effective nuclear charge.

A) 1s
B) 3p
C) 3d
D) 5s
E) 5p

5) In which orbital does an electron in a phosphorus atom experience the greatest shielding?

A) 2p
B) 3s
C) 3p
D) 3s
E) 1s

6) Điền vào chỗ trống: Năng lượng ion hóa thứ nhất _____ khi đi từ trái qua phải cùng chu kì, và _____ Khi đi từ trên xuống dưới trong cùng một nhóm.

A) tăng dần, tăng dần
B) tăng dần, giảm dần
C) giảm dần, tăng dần
D) giảm dần, giảm dần

7) The _____ have the most negative electron affinities.

A) alkaline earth metals
B) alkali metals
C) halogens
D) transition metals
E) chalcogens

8) Nói chung, khi đi từ trái qua phải trong cùng một chu kì,
(1) bán kính nguyên tử _____;
(2) ái lực electron trở nên _____ âm; và
(3) năng lượng ion hóa thứ nhất _____.

A) decreases, decreasingly, increases
B) increases, increasingly, decreases
C) increases, increasingly, increases
D) decreases, increasingly, increases
E) decreases, increasingly, decreases

9) Element M reacts with chlorine to form a compound with the formula MCl_2. Element M is more reactive than magnesium and has a smaller radius than barium. This element is _____.

A) Sr
B) K
C) Na
D) Ra
E) Be

10) The oxide of which element below can react with hydrochloric acid?

A) sulfur
B) selenium
C) nitrogen
D) sodium
E) carbon

11) Metals can be _____ at room temperature.

A) liquid only
B) solid only
C) solid or liquid
D) solid, liquid, or gas
E) liquid or gas

12) Most of the elements on the periodic table are _____.

A) gases
B) nonmetals
C) metalloids
D) liquids
E) metals

13) Na reacts with element X to form an ionic compound with the formula Na_3X. Ca will react with X to form _____.

A) CaX_2
B) CaX
C) Ca_2X_3
D) Ca_3X_2
E) Ca_3X

14) What is the coefficient of M when the following equation is completed and balanced if M is an alkali metal?

$$M(s) + H_2O(l) \rightarrow$$

A) 1
B) 2
C) 3
D) 4
E) 0

28) Which nonmetal exists as a diatomic solid?

A) bromine
B) antimony
C) phosphorus
D) iodine
E) boron

29) The most common and stable allotrope of sulfur is _____.

A) S
B) S_2
C) S_4
D) S_8
E) Sulfur does not form allotropes.

30) Which group 6A element is a metal?

A) tellurium and polonium
B) sulfur
C) selenium
D) tellurium
E) polonium

31) The most common sulfur ion has a charge of _____.

A) 2-
B) 1-
C) 4+
D) 6+
E) Sulfur does not form ions.

32) The element phosphorus exists in two forms in nature called white phosphorus and red phosphorus. These two forms are examples of _____.

A) isotopes
B) allotropes
C) oxidation
D) metalloids
E) noble gases

33) Which periodic table group contains only nonmetals?

A) 8A
B) 2A
C) 6A
D) 7A
E) 5A

34) Of the hydrogen halides, only _____ is a weak acid.

A) HCl (aq)
B) HBr (aq)
C) HF (aq)
D) HI (aq)
E) They are all weak acids.

35) All the elements in group 8A are gases at room temperature. Of all the groups in the periodic table, only group _____ contains examples of elements that are gas, liquid, and solid at room temperature.

A) 2A
B) 1A
C) 7A
D) 5A
E) 6A

36) The only noble gas that does <u>not</u> have the ns^2np^6 valence electron configuration is _____.

A) radon
B) neon
C) helium
D) krypton
E) All noble gases have the ns^2np^6 valence electron configuration.

37) The first noble gas to be incorporated into a compound was _____.

A) Ar
B) Kr
C) He
D) Ne
E) Xe

38) Of the halogens, which are gases at room temperature and atmospheric pressure?

A) fluorine, bromine, and iodine
B) fluorine, chlorine, and bromine
C) fluorine, chlorine, bromine, and iodine
D) fluorine, chlorine, and iodine
E) fluorine and chlorine

39) $2F_2(g) + 2H_2O(l) \rightarrow$ _____

A) 2 HF(aq) + 2HFO(aq)
B) $2F^-(aq) + 2H^+(aq) + H_2O_2(aq)$
C) $4HF(aq) + O_2(g)$
D) $2HF_2(aq) + 2OH^-(aq)$
E) $4\ HF(aq) + 2O^{2-}(aq)$

40) $Cl_2(g) + H_2O(l) \rightarrow$ _____

A) HCl (aq) + HOCl (aq)
B) $2Cl^-(aq) + H_2O(l)$
C) $2HCl(aq) + O_2(g)$
D) $2HCl(aq) + O_2^-(g)$
E) $Cl_2(aq) + H_2O(l)$

7.2 Multiple-Choice Questions

1) In which set of elements would all members be expected to have very similar chemical properties?

A) O, S, Se
B) N, O, F
C) Na, Mg, K
D) S, Se, Si
E) Ne, Na, Mg

2) Which element would be expected to have chemical and physical properties closest to those of fluorine?

A) S
B) Fe
C) Ne
D) O

E) Cl

3) Electrons in the 1s subshell are much closer to the nucleus in Ar than in He due to the larger _____ in Ar.

A) nuclear charge
B) paramagnetism
C) diamagnetism
D) Hund's rule
E) azimuthal quantum number

4) In which orbital does an electron in a phosphorus atom experience the greatest effective nuclear charge?

A) 1s
B) 2s
C) 2p
D) 3s
E) 3p

5) Atomic radius generally increases as we move _____.

A) down a group and from right to left across a period
B) up a group and from left to right across a period
C) down a group and from left to right across a period
D) up a group and from right to left across a period
E) down a group; the period position has no effect

6) Trật tự đúng (xếp theo bán kính) của Mg, Na, P, Si và Ar là

A) Mg > Na > P > Si > Ar
B) Ar > Si > P > Na > Mg
C) Si > P > Ar > Na > Mg
D) Na > Mg > Si > P > Ar
E) Ar > P > Si > Mg > Na

7) The atomic radius of main-group elements generally increases down a group because _____.

A) effective nuclear charge increases down a group
B) effective nuclear charge decreases down a group
C) effective nuclear charge zigzags down a group
D) the principal quantum number of the valence orbitals increases
E) both effective nuclear charge increases down a group and the principal quantum number of the valence orbitals increases

8) Screening of the nuclear charge by core electrons in atoms is _____.

A) less efficient than that by valence electrons
B) more efficient than that by valence electrons
C) essentially identical to that by valence electrons
D) responsible for a general decrease in atomic radius going down a group
E) both essentially identical to that by valence electrons and responsible for a general decrease in atomic radius going down a group

9) Which one of the following atoms has the largest radius?

A) O
B) F
C) S
D) Cl
E) Ne

10) The effective nuclear charge of an atom is primarily affected by _____.

A) inner electrons
B) outer electrons
C) nuclear charge
D) electrondistribution
E) orbital radial probability

11) Which one of the following atoms has the largest radius?

A) Sr
B) Ca
C) K

D) Rb
E) Y

12) Which one of the following has the smallest radius?

A) Na
B) Cl
C) Fe
D) P
E) Br

13) Which one of the following atoms has the largest radius?

A) I
B) Co
C) Ba
D) Sr
E) Ca

14) Which one of the following elements has the largest atomic radius?

A) Se
B) As
C) S
D) Sb
E) Te

15) Which one of the following elements has the largest atomic radius?

A) O
B) F
C) Al
D) P
E) B

16) In which of the following atoms is the 2s orbital closest to the nucleus?

A) S
B) Cl
C) P
D) Si
E) The 2s orbitals are the same distance from the nucleus in all of these atoms.

17) In which of the following atoms is the 3s orbital closest to the nucleus?

A) Br
B) Cl
C) At
D) I
E) The 3s orbitals are the same distance from the nucleus in all of these atoms.

18) Thứ tự nào sau đây đúng (xếp theo chiều tăng dần bán kính)?

A) O < F < S < Mg < Ba
B) F < O < S < Mg < Ba
C) F < O < S < Ba < Mg
D) O < F < S < Ba < Mg
E) F < S < O < Mg < Ba

20) _____ is isoelectronic with argon and _____ is isoelectronic with neon.

A) Cl^-, F^-
B) Cl^-, Cl^+
C) F+, F^-
D) Ne^-, Kr^+
E) Ne^-, Ar^+

21) Which of the following is an isoelectronic series?

A) B^{5-},Sr^{4-},As^{3-},Te^{2-}
B) F^-, Cl^-,Br^-,I^-
C) S, Cl, Ar, K
D) Si^{2-},P^{2-},S^{2-},Cl^{2-}
E) O^{2-},F^-, Ne,Na^+

22) Which isoelectronic series is correctly arranged in order of increasing radius?

A) $K^+ < Ca^{2+} < Ar < Cl^-$
B) $Cl^- < Ar < K^+ < Ca^{2+}$
C) $Ca^{2+} < Ar < K^+ < Cl^-$
D) $Ca^{2+} < K^+ < Ar < Cl^-$
E) $Ca^{2+} < K^+ < Cl^- < Ar$

23) The _____ ion is essential for the enzymatic action of carbonic anhydrase and the _____ ion is toxic to this enzyme.

A) sodium, cadmium
B) potassium, arsenic
C) zinc, cadmium
D) calcium, cadmium
E) calcium, arsenic

24) Which of the following correctly lists the five atoms in order of increasing size (smallest to largest)?

A) F < K < Ge < Br < Rb
B) F < Ge < Br < K < Rb
C) F < K < Br < Ge < Rb
D) F < Br < Ge < K < Rb
E) F < Br < Ge < Rb < K

25) Of the choices below, which gives the order for first ionization energies?

A) Cl > S > Al > Ar > Si
B) Ar > Cl > S > Si > Al
C) Al > Si > S > Cl > Ar
D) Cl > S > Al > Si > Ar
E) S > Si > Cl > Al > Ar

26) Of the following atoms, which has the largest first ionization energy?

A) Br
B) O
C) C
D) P
E) I

27) Of the following elements, which has the largest first ionization energy?

A) Na
B) Al
C) Se
D) Cl
E) Br

28) Of the following elements, which has the largest first ionization energy?

A) K
B) Rb
C) Sr
D) Ca
E) Ba

29) Of the following elements, which has the largest first ionization energy?

A) Se
B) As
C) S
D) Sb
E) Ge

30) Of the following elements, which has the largest first ionization energy?

A) B
B) N
C) P
D) Si
E) C

31) Of the elements below, _____ has the largest first ionization energy.

A) Li
B) K
C) Na
D) H
E) Rb

32) _____ have the lowest first ionization energies of the groups listed.

A) Alkali metals
B) Transition elements
C) Halogens
D) Alkaline earth metals
E) Noble gases

33) Which of the following has the largest second ionization energy?

A) Si

B) Mg
C) Al
D) Na
E) P

34) Which of the following has the largest second ionization energy?

A) Ca
B) K
C) Ga
D) Ge
E) Se

35) Which equation correctly represents the first ionization of aluminum?

A) $Al^{-}(g) \rightarrow Al(g) + e^{-}$

B) $Al(g) \rightarrow Al^{-}(g) + e^{-}$

C) $Al(g) + e^{-} \rightarrow Al^{-}(g)$

D) $Al(g) \rightarrow Al^{+}(g) + e^{-}$

E) $Al^{+}(g) + e^{-} \rightarrow Al(g)$

36) Which of the following correctly represents the second ionization of aluminum?

A) $Al^{+}(g) + e^{-} \rightarrow Al(g)$

B) $Al(g) \rightarrow Al^{+}(g) + e^{-}$

C) $Al\text{-}(g) + e^{-} \rightarrow Al^{2-}(g)$

D) $Al^{+}(g) + e^{-} \rightarrow Al^{2+}(g)$

E) $Al^{+}(g) \rightarrow Al^{2+}(g) + e^{-}$

37) Which equation correctly represents the first ionization of phosphorus?

A) $P(g) + e^{-} \rightarrow P^{-}(g)$

B) $P(g) \rightarrow P^{-}(g) + e^{-}$

C) $P(g) \rightarrow P^{+}(g) + e^{-}$

D) $P^{-}(g) \rightarrow P(g) + e^{-}$

E) $P^{+}(g) + e^{-} \rightarrow P(g)$

38) Which of the following correctly represents the second ionization of phosphorus?

A) $P^{+}(g) + e^{-} \rightarrow P^{2+}(g)$

B) $P(g) \rightarrow P^{+}(g) + e^{-}$

C) $P^{-}(g) + e^{-} \rightarrow P^{2-}(g)$

D) $P^{+}(g) \rightarrow P^{2+}(g) + e^{-}$

E) $P^{+}(g) + e^{-} \rightarrow P(g)$

39) Which equation correctly represents the first ionization of calcium?

A) $Ca(g) \rightarrow Ca^{+}(g) + e^{-}$

B) $Ca(g) \rightarrow Ca^{-}(g) + e^{-}$

C) $Ca(g) + e^{-} \rightarrow Ca^{-}(g)$

D) $Ca^{-}(g) \rightarrow Ca(g) + e^{-}$

E) $Ca^{+}(g) + e^{-} \rightarrow Ca(g)$

40) Which of the following correctly represents the second ionization of calcium?

A) $Ca(g) \rightarrow Ca^{+}(g) + e^{-}$

B) $Ca^{+}(g) \rightarrow Ca^{2+}(g) + e^{-}$

C) $Ca\text{-}(g) + e^{-} \rightarrow Ca^{2-}(g)$

D) $Ca^{+}(g) + e^{-} \rightarrow Ca^{2+}(g)$

E) $Ca^{+}(g) + e^{-} \rightarrow Ca(g)$

41) Which ion below has the largest radius?

A) Cl^{-}
B) K^{+}
C) Br^{-}
D) F^{-}
E) Na^{+}

42) The ion with the smallest diameter is _____.

A) Br^{-}
B) Cl^{-}
C) I^{-}
D) F^{-}
E) O^{2-}

43) Of the following species, _____ has the largest radius.

A) Rb^+
B) Sr^{2+}
C) Br^-
D) Kr
E) Ar

44) Of the following elements, _____ has the most negative electron affinity.

A) Na
B) Li
C) Be
D) N
E) F

45) Of the following elements, _____ has the most negative electron affinity.

A) S
B) Cl
C) Se
D) Br
E) I

46) Of the following elements, _____ has the most negative electron affinity.

A) P
B) Al
C) Si
D) Cl
E) B

47) Of the following elements, _____ has the most negative electron affinity.

A) O
B) K
C) B
D) Na
E) S

48) Chlorine is much more apt to exist as an anion than is sodium. This is because _____.

A) chlorine is bigger than sodium
B) chlorine has a greater ionization energy than sodium does
C) chlorine has a greater electron affinity than sodium does
D) chlorine is a gas and sodium is a solid
E) chlorine is more metallic than sodium

49) Sodium is much more apt to exist as a cation than is chlorine. This is because _____.

A) chlorine is a gas and sodium is a solid
B) chlorine has a greater electron affinity than sodium does
C) chlorine is bigger than sodium
D) chlorine has a greater ionization energy than sodium does
E) chlorine is more metallic than sodium

50) Which equation correctly represents the electron affinity of calcium?

A) $Ca(g) + e^- \rightarrow Ca^-(g)$
B) $Ca(g) \rightarrow Ca^+(g) + e^-$
C) $Ca(g) \rightarrow Ca^-(g) + e^-$
D) $Ca^-(g) \rightarrow Ca(g) + e^-$
E) $Ca^+(g) + e^- \rightarrow Ca(g)$

51) Which of the following correctly represents the electron affinity of bromine?

A) $Br(g) \rightarrow Br^+(g) + e^-$
B) $Br(g) + e^- \rightarrow Br^-(g)$
C) $Br_2(g) + e^- \rightarrow Br^-(g)$
D) $Br_2(g) + 2e^- \rightarrow 2Br^-(g)$
E) $Br^+(g) + e^- \rightarrow Br(g)$

Consider the following electron configurations to answer the questions that follow:

(i) $1s^2 2s^2 2p^6 3s^1$
(ii) $1s^2 2s^2 2p^6 3s^2$

(iii) $1s^2 2s^2 2p^6 3s^2 3p^1$

(iv) $1s^2 2s^2 2p^6 3s^2 3p^4$

(v) $1s^2 2s^2 2p^6 3s^2 3p^5$

52) The electron configuration belonging to the atom with the highest second ionization energy is _____.

A) (i)
B) (ii)
C) (iii)
D) (iv)
E) (v)

53) The electron configuration that belongs to the atom with the lowest second ionization energy is _____.

A) (i)
B) (ii)
C) (iii)
D) (iv)
E) (v)

54) The electron configuration of the atom with the most negative electron affinity is _____.

A) (i)
B) (ii)
C) (iii)
D) (iv)
E) (v)

55) The electron configuration of the atom that is expected to have a positive electron affinity is _____.

A) (i)
B) (ii)
C) (iii)
D) (iv)
E) (v)

56) Of the elements below, _____ is the most metallic.

A) sodium
B) barium
C) magnesium
D) calcium
E) cesium

57) In the generation of most anions, the energy change (kJ/mol) that _____ an electron is _____.

A) removes, positive
B) adds, positive
C) removes, negative
D) adds, negative
E) None of the above is correct.

58) Which one of the following is a metalloid?

A) Ge
B) S
C) Br
D) Pb
E) C

59) Of the elements below, _____ is the most metallic.

A) Na
B) Mg
C) Al
D) K
E) Ar

60) The list that correctly indicates the order of metallic character is _____.

A) B > N > C
B) F > Cl > S
C) Si > P > S
D) P > S > Se
E) Na > K > Rb

61) Of the elements below, _____ has the highest melting point.

A) Ca
B) K
C) Fe
D) Na

E) Ba

62) Of the following metals, _____ exhibits multiple oxidation states.

A) Al
B) Cs
C) V
D) Ca
E) Na

63) Of the following oxides, _____ is the most acidic.

A) CaO
B) CO_2
C) Al_2O_3
D) Li_2O
E) Na_2O

64) The acidity of carbonated water is due to the _____.

A) presence of sulfur
B) reaction of CO_2 and H_2O
C) addition of acid
D) nonmetal oxides
E) none of the above

65) The element in the periodic table that looks like a metal, is a poor thermal conductor, and acts as an electrical semiconductor is _____.

A) Sn
B) B
C) As
D) Si
E) Ge

66) Transition metals within a period differ mainly in the number of _____ electrons.

A) s
B) p
C) d
D) f
E) all of the above

67) Which one of the following compounds would produce an acidic solution when dissolved in water?

A) Na_2O
B) CaO
C) MgO
D) CO_2
E) SrO

68) Nonmetals can be _____ at room temperature.

A) solid, liquid, or gas
B) solid or liquid
C) solid only
D) liquid only
E) liquid or gas

69) Which of the following is <u>not</u> a characteristic of metals?

A) acidic oxides
B) low ionization energies
C) malleability
D) ductility
E) These are all characteristics of metals.

70) When two elements combine to form a compound, the greater the difference in metallic character between the two elements, the greater the likelihood that the compound will be _____.

A) a gas at room temperature
B) a solid at room temperature
C) metallic
D) nonmetallic
E) a liquid at room temperature

71) Between which two elements is the difference in metallic character the greatest?

A) Rb and O
B) O and I
C) Rb and I

D) Li and O
E) Li and Rb

72) Which of the following traits characterizes the alkali metals?

A) very high melting point
B) existence as diatomic molecules
C) formation of dianions
D) the lowest first ionization energies in a period
E) the smallest atomic radius in a period

73) This element is more reactive than lithium and magnesium but less reactive than potassium. This element is _____.

A) Na
B) Rb
C) Ca
D) Be
E) Fr

74) Which one of the following is not true about the alkali metals?

A) They are low density solids at room temperature.
B) They all readily form ions with a +1 charge.
C) They all have 2 electrons in their valence shells.
D) They are very reactive elements.
E) They have the lowest first ionization energies of the elements.

75) Consider the general valence electron configuration of ns^2np^5 and the following statements:

(i) Elements with this electron configuration are expected to form -1 anions.
(ii) Elements with this electron configuration are expected to have large positive electron affinities.
(iii) Elements with this electron configuration are nonmetals.
(iv) Elements with this electron configuration form acidic oxides.
Which statements are true?

A) (i) and (ii)
B) (i), (ii), and (iii)
C) (ii) and (iii)
D) (i), (iii,) and (iv)
E) All statements are true.

76) Consider the following properties of an element:
(i) It is solid at room temperature.
(ii) It easily forms an oxide when exposed to air.
(iii) When it reacts with water, hydrogen gas evolves.
(iv) It must be stored submerged in oil.
Which element fits the above description the best?

A) sulfur
B) copper
C) mercury
D) sodium
E) magnesium

77) Alkaline earth metals _____.

A) have the smallest atomic radius in a given period
B) form monoanions
C) form basic oxides
D) exist as triatomic molecules
E) form halides with the formula MX

78) Which of the following generalizations cannot be made with regard to reactions of alkali metals? (The symbol M represents any one of the alkali metals.)

A) $M(s) + O_2(g) \rightarrow MO_2(s)$
B) $2M(s) + 2H_2O(l) \rightarrow 2MOH(aq) + H_2(g)$
C) $2M(s) + H_2(g) \rightarrow 2MH(s)$
D) $2M(s) + Cl_2(g) \rightarrow 2MCl(s)$
E) $2M(s) + S(s) \rightarrow M_2S(s)$

79) The reaction of alkali metals with oxygen produce _____.

A) oxides
B) peroxides
C) superoxides
D) all of the above
E) none of the above

80) Alkali metals tend to be more reactive than alkaline earth metals because _____.

A) alkali metals have lower densities
B) alkali metals have lower melting points
C) alkali metals have greater electron affinities
D) alkali metals have lower ionization energies
E) alkali metals are not more reactive than alkaline earth metals

81) The alkali metal that is naturally radioactive is _____.

A) rubidium
B) cesium
C) lithium
D) francium
E) sodium

83) The alkali metal that is used to treat manic-depressive illness is _____.

A) Na
B) K
C) Li
D) Rb
E) Cs

84) All of the following are ionic compounds except _____.

A) K_2O
B) Na_2SO_4
C) SiO_2
D) Li_3N
E) NaCl

85) Which one of the following compounds produces a basic solution when dissolved in water?

A) SO_2
B) Na_2O
C) CO_2
D) OF_2
E) O_2

86) Element M reacts with oxygen to form an oxide with the formula MO. When MO is dissolved in water, the resulting solution is basic. Element M could be _____.

A) Na
B) Ba
C) S
D) N
E) C

87) Which element is solid at room temperature?

A) Cl_2
B) F_2
C) Br_2
D) I_2
E) H_2

88) _____ is a unique element and does not truly belong to any family.

A) Nitrogen
B) Radium
C) Hydrogen
D) Uranium
E) Helium

89) Of the following statements, _____ is <u>not</u> true for oxygen.

A) The most stable allotrope of oxygen is O_2.
B) The chemical formula of ozone is O_3.
C) Dry air is about 79% oxygen.
D) Oxygen forms peroxide and superoxide anions.
E) Oxygen is a colorless gas at room temperature.

90) Which one of the following elements has an allotrope that is produced in the upper atmosphere by lightning?

A) N
B) O
C) S
D) Cl
E) He

91) In nature, sulfur is most commonly found in _____.

A) pure elemental sulfur
B) sulfur oxides
C) metal sulfides
D) sulfuric acid
E) H_2S

92) All of the halogens _____.

A) exist under ambient conditions as diatomic gases
B) tend to form positive ions of several different charges
C) tend to form negative ions of several different charges
D) exhibit metallic character
E) form salts with alkali metals with the formula MX

93) This element reacts with hydrogen to produce a gas with the formula HX. When dissolved in water, HX forms an acidic solution. X is _____,

A) Na
B) H
C) C
D) Br
E) O

94) The noble gases were, until relatively recently, thought to be entirely unreactive. Experiments in the early 1960s showed that Xe could, in fact, form compounds with fluorine. The formation of compounds consisting of Xe is made possible by _____.

A) the availability of xenon atoms
B) xenon's noble gas electron configuration
C) the stability of xenon atoms
D) xenon's relatively low ionization energy
E) xenon's relatively low electron affinity

95) Of the following elements, which have been shown to form compounds?
helium neon argon krypton xenon

A) xenon and argon
B) xenon only
C) xenon, krypton, and argon
D) xenon and krypton
E) None of the above can form compounds.

96) In nature, the noble gases exist as

A) monatomic gaseous atoms
B) the gaseous fluorides
C) solids in rocks and in minerals
D) alkali metal salts
E) the sulfides

97) Hydrogen is unique among the elements because _____.

1. It is not really a member of any particular group.
2. Its electron is not at all shielded from its nucleus.
3. It is the lightest element.
4. It is the only element to exist at room temperature as a diatomic gas.
5. It exhibits some chemical properties similar to those of groups 1A and 7A.

A) 1, 2, 3, 5
B) 1, 2, 3, 4, 5
C) 1, 4, 5
D) 3, 4
E) 2, 3, 4, 5

98) Hydrogen is unique among the elements because _____.
1. It has only one valence electron.
2. It is the only element that can emit an atomic

spectrum.
3. Its electron is not at all shielded from its nucleus.
4. It is the lightest element.
5. It is the only element to exist at room temperature as a diatomic gas.

A) 1, 2, 3, 4, 5
B) 1, 3, 4
C) 1, 2, 3, 4
D) 2, 3, 4
E) 3, 4

99) Ozone is a (an) _____ of oxygen.

A) isotope
B) allotrope
C) precursor
D) peroxide
E) free radical

100) Astatine has a _____ density and a _____ atomic radius compared to iodine.

A) greater; greater
B) smaller; greater
C) smaller; smaller
D) greater; smaller
E) equal; equal

101) Xenon has been shown to form compounds only when it is combined with _____.

A) something with a tremendous ability to remove electrons from other substances
B) another noble gas
C) something with a tremendous ability to donate electrons to other substances
D) an alkali metal
E) an alkaline earth metal

7.3 Short Answer Questions

1) The degree of interaction between two electrical charges depends on the _____ and the _____ of the charges and the distance between them.

2) As successive electrons are removed from an element , the ionization energy _____.

3) Which noble gas has the highest first ionization energy?

4) When electrons are removed from a lithium atom they are removed first from which orbital?

5) Write the balanced reaction between zinc oxide and sulfuric acid.

6) An added electron to the element bromine goes into which orbital?

7) What are the elements called that are located between the metals and non-metals?

8) In their compounds, the charges on the alkali metals and the alkaline earth metals are _____ and _____, respectively.

9) Complete the following : $P_4O_{10} + 6H_2O$

10) Which metal is a liquid at room temperature?

11) $[Xe]6s^2$ is the electron configuration for _____.

12) $[Kr]5s^2$ is the electron configuration for _____.

13) Which alkali metals can react with oxygen to form either the peroxide or the superoxide?

14) Write the balanced equation for the reaction of potassium with water.

15) Write the balanced equation for the reaction of elemental fluorine with liquid water.

16) Write the balanced equation for the reaction of elemental chlorine with liquid water.

17) Of the alkaline earth metals, which two elements are the least reactive?

18) List seven nonmetals that exist as diatomic molecules in their elemental forms.

19) All of the group VIA elements are solids except _____.

20) Which noble gas has the lowest first ionization energy?

7.4 True/False Questions.

1) The effective nuclear charge acting on an electron is larger than the actual nuclear charge.

2) The effective nuclear charge in an atom is proportional to the number of nuclear protons.

3) The atomic radius of iodine is one-half the distance separating the iodine nuclei.

4) A group of ions all containing the same number of electrons constitute an isoelectronic series.

5) Cadmium preferentially binds to carbonic anhydrase, displacing zinc.

6) Elements that readily conduct electricity are elements with low ionization energies.

7) Electron affinity measures how easily an atom gains an electron.

8) Heavy noble gases can form compounds with fluorine.