Chapter 7
Quiz

1) 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

2) 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

3) The effective nuclear charge of an atom is primarily affected by _____.
A) inner electrons
B) outer electrons
C) nuclear charge
D) electron distribution
E) orbital radial probability

4) Of the following, which gives the correct order for atomic radius for Mg, Na, P, Si and Ar?
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

5) Which of the following is an isoelectronic series?
A) B^{5-}, Si^{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^+

6) 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) $Ca^{2+} < K^{+} < Cl^{-} < Ar$

7) 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

8) _____have the lowest <u>first</u> ionization energies of the groups listed.
A) Alkali metals
B) Transition elements
C) Halogens
D) Alkaline earth metals
E) Noble gases

9) Which of the following correctly represents the <u>third</u> ionization of aluminum?
A) $Al^{2+}(g) + e^{-} \rightarrow Al^{+}(g)$
B) $Al(g) \rightarrow Al^{+}(g) + e^{-}$
C) $Al^{2-}(g) + e^{-} \rightarrow Al^{3-}(g)$
D) $Al^{2+}(g) + e^{-} \rightarrow Al^{3+}(g)$
E) $Al^{2+}(g) \rightarrow Al^{3+}(g) + e^{-}$

10) Which of the following correctly represents the <u>first</u> ionization of oxygen?
A) $O(g) \rightarrow O^{+}(g) + e^{-}$
B) $O^{+}(g) + e^{-} \rightarrow O^{2+}(g)$
C) $O(g) + e^{-} \rightarrow O^{-}(g)$
D) $O^{-}(g) + e^{-} \rightarrow O^{2-}(g)$
E) $O^{+}(g) + e^{-} \rightarrow O(g)$

11) Which ion below has the largest radius?
A) Cl^{-}
B) K^{+}
C) Br^{-}
D) F^{-}
E) Na^{+}

12) Which of the following species has the smallest ionic radius?
A) Al^{3+}
B) Na^{+}
C) Mg^{2+}
D) S^{2-}
E) Cl^{-}

13) Of the following elements, _____has the most negative electron affinity.
A) O
B) K
C) B
D) Na
E) S

14) 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) $Ca^+\ (g) + e^- \rightarrow Ca\ (g)$

15) Of the following metals, _____exhibits multiple oxidation states.
A) Al
B) Rb
C) Mg
D) Ni
E) Cs

16) Which of the following oxides do not produce an acidic solution when dissolved in water?
A) SO_3
B) P_2O_5
C) CO_2
D) Al_2O_3
E) Cl_2O

17) 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

18) Ozone is a a(n) _____of oxygen.
A) isotope
B) allotrope
C) precursor
D) peroxide
E) free radical

19) 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

20) The greatest effective nuclear charge in a many-electron atom is experienced by an electron in a _____subshell.
A) 6s
B) 5s
C) 2s
D) 4s
E) 3s

21) 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

22) The _____have the most negative electron affinities.
A) alkaline earth metals
B) alkali metals
C) halogens
D) transition metals
E) chalcogens

23) 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

24) 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

25) Oxides of most nonmetals combine with water to form _____.
A) an acid

B) a base
C) water and a salt
D) water
E) hydrogen gas

26) In which orbital does an electron in a nitrogen atom experience the greatest shielding?
A) 3p
B) 3s
C) 2p
D) 2s
E) 1s

27) In which orbital does an electron in a copper atom experience the greatest effective nuclear charge?
A) 1s
B) 4s
C) 4p
D) 4d
E) 3d

28) _____is isoelectronic with scandium.
A) Cr^{3+}
B) Mn^{5+}
C) Mn
D) Mn^{4-}
E) K^{+}

29) Which one of the following atoms has the largest radius?
A) In
B) Sn
C) Sb
D) Te
E) I

30) Which one of the following has the smallest radius?
A) Na
B) Al
C) K
D) Ca

31) The ion with the smallest diameter is _____.
A) Li^{+}
B) Na^{+}
C) K^{+}
D) Rb^{+}

E) Cs^+

32) When dissolved in water, _____produces a basic solution.
A) SO_2
B) Rb_2O
C) OBr_2
D) $ZnCl_2$
E) N_2

33) 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) strontium
B) bromine
C) selenium
D) germanium
E) nitrogen

34) 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) chlorine
B) calcium
C) oxygen
D) germanium
E) arsenic

35) Element M reacts with oxygen to form an oxide with the formula M_2O. When M_2O is dissolved in water, the resulting solution is basic. Element M could be _____.
A) calcium
B) bromine
C) oxygen
D) carbon
E) nitrogen