Student name:__________

TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.

1) The mass of a neutron is equal to the mass of a proton plus the mass of an electron.
- ⊙ true
- ⊙ false

2) All neutral atoms of tin have 50 protons and 50 electrons.
- ⊙ true
- ⊙ false

3) Copper (Cu) is a transition metal.
- ⊙ true
- ⊙ false

4) Lead (Pb) is a main group element.
- ⊙ true
- ⊙ false

5) Almost all the mass of an atom is concentrated in the nucleus.
- ⊙ true
- ⊙ false

6) When a beam of alpha particles passes between two electrically charged plates, the beam is deflected toward the positive plate.
- ⊙ true
- ⊙ false

7) J. J. Thomson suggested the term "radioactivity" to describe the spontaneous emission of particles and/or radiation.
- ⊙ true
- ⊙ false

8) The energy of a photon is directly proportional to the wavelength of the radiation.
- ⊙ true
- ⊙ false

9) The frequency of a photon is inversely proportional to the wavelength of the radiation.
- ⊙ true
- ⊙ false

10) The principal quantum number designates the size of the orbital.
- ⊚ true
- ⊚ false

11) The magnetic quantum number designates the shape of the atomic orbital.
- ⊚ true
- ⊚ false

12) If $n = 2$ then $l = 0, -1$, and 1.
- ⊚ true
- ⊚ false

13) An electron in a 3 *p* orbital could have a value of 2 for its angular momentum quantum number (l).
- ⊚ true
- ⊚ false

14) Each shell (principal energy level) of quantum number *n* contains *n* subshells.
- ⊚ true
- ⊚ false

15) For all atoms of the same element, the 2 *s* orbital is larger than the 1 *s* orbital.
- ⊚ true
- ⊚ false

16) The periodic table was first arranged according to increasing atomic masses.
- ⊚ true
- ⊚ false

17) Coulomb's law is the attractive force (F) between two oppositely charged particles (Q_1 and Q_2). It is directly proportional to the product of the charges and inversely proportional to the distance (d) between the objects cubed.
- ⊚ true
- ⊚ false

18) In Mendeleev's version of the periodic table, the elements were arranged in order of increasing atomic number.
- ⊚ true
- ⊚ false

19) Moseley's measurements of nuclear charges of the elements provided the basis for arranging the elements of the periodic table in order of increasing atomic number.
- ⊙ true
- ⊙ false

20) In neutral atoms, the 3 *d* orbitals have higher energy than the 4 *s* orbitals.
- ⊙ true
- ⊙ false

21) The electron configuration of atomic argon is the same as the chloride ion (Cl^-).
- ⊙ true
- ⊙ false

22) Elements in which the outermost electron has the same principal quantum number, *n*, show similar chemical properties.
- ⊙ true
- ⊙ false

23) Electrons will not pair in degenerate orbitals if an empty orbital is available and, according to Hund's rule, the degenerate orbitals must all contain one electron before any of them can contain two electrons.
- ⊙ true
- ⊙ false

24) According to the Aufbau principle, the most stable arrangement of electrons places them in degenerate orbitals.
- ⊙ true
- ⊙ false

25) The electron configuration for chlorine is $[Ne]3s^2\ 3p^5$.
- ⊙ true
- ⊙ false

26) The radii of ions are always smaller than the radii of the corresponding atoms of the same element.
- ⊙ true
- ⊙ false

27) Atomic size decreases across a period due to an increase in the effective nuclear charge, Z_{eff}.
- ◎ true
- ◎ false

28) Ionic compounds tend to form between metals and nonmetals when electrons are transferred from an element with high ionization energy (metal) to an element with a low electron affinity (nonmetal).
- ◎ true
- ◎ false

29) Ionic compounds may carry a net positive or net negative charge.
- ◎ true
- ◎ false

30) When an alkali metal combines with a nonmetal, a covalent bond is normally formed.
- ◎ true
- ◎ false

31) The empirical formula of C_6H_6 is CH.
- ◎ true
- ◎ false

32) The empirical formula is the simplest whole number ratio of atoms representing a chemical formula of a molecule.
- ◎ true
- ◎ false

33) Many compounds can be represented with the same empirical formula.
- ◎ true
- ◎ false

34) There is only one distinct empirical formula for each compound that exists.
- ◎ true
- ◎ false

35) The molecular formula is a whole number multiple of the empirical formula.
- ◎ true
- ◎ false

36) Ionic compounds tend to form between metals and nonmetals when electrons are transferred from an element with high ionization energy (metal) to an element with a low electron affinity (nonmetal).
- ⊙ true
- ⊙ false

37) Lewis theorized the *octet rule* to describe chemical bonding where atoms lose, gain, or share electrons in order to achieve a noble gas configuration.
- ⊙ true
- ⊙ false

38) Only valence electrons are shown in the Lewis structure held together by covalent bonds.
- ⊙ true
- ⊙ false

39) A double bond cannot exist between a carbon atom and an oxygen atom.
- ⊙ true
- ⊙ false

40) A triple bond cannot exist between a carbon atom and a hydrogen atom.
- ⊙ true
- ⊙ false

41) Unshared electrons are always shown in pairs around an atom.
- ⊙ true
- ⊙ false

42) The octet rule works best for elements in the 3rd period of the periodic table.
- ⊙ true
- ⊙ false

43) Multiple bonds are longer than single bonds.
- ⊙ true
- ⊙ false

44) Single bonds are stronger than multiple bonds.
- ⊙ true
- ⊙ false

45) Octane, C_8H_{18}, boils at 125°C, whereas water boils at 100°C. This information suggests that the dispersion forces in nonpolar octane molecules are stronger than the dispersion forces and hydrogen bonding in water.

- ⊙ true
- ⊙ false

46) The energy of a hydrogen bond is greater than that of a typical covalent bond.

- ⊙ true
- ⊙ false

47) Only molecules which do not have dipole moments can experience dispersion forces.

- ⊙ true
- ⊙ false

48) To correctly determine the molecular shape of a molecule requires that you first draw the Lewis structure for the molecule.

- ⊙ true
- ⊙ false

49) According to molecular orbital theory, all diatomic molecules with an even number of electrons are diamagnetic.

- ⊙ true
- ⊙ false

50) In the valence bond treatment, a π bond is formed when two *p* orbitals overlap side to side.

- ⊙ true
- ⊙ false

51) In the valence bond treatment, overlap of an *s* orbital on one atom with a sp^3 orbital on another atom gives rise to a σ bond.

- ⊙ true
- ⊙ false

52) Atoms of period 3 and beyond can undergo sp^3d^2 hybridization, but atoms of period 2 cannot.

- ⊙ true
- ⊙ false

53) The angles between *sp*^{2} hybrid orbitals are 109.5°.
- ⊙ true
- ⊙ false

54) The bond angle for a *sp* hybrid orbital is smaller than the bond angle for an *sp*^{2} hybrid orbital.
- ⊙ true
- ⊙ false

55) To make a *sp*^{3} hybrid orbital, one *s* atomic orbital is mixed with three *p* atomic orbitals.
- ⊙ true
- ⊙ false

56) A molecule that contains polar bonds will always have a dipole moment.
- ⊙ true
- ⊙ false

57) According to the VSEPR model, a molecule with the general formula AB_3 possessing two lone pairs on the central atom has a trigonal planar molecular geometry.
- ⊙ true
- ⊙ false

58) The number of lone pairs of electrons on the central atoms is an important factor used to determine the molecular shape or molecular geometry.
- ⊙ true
- ⊙ false

59) Pi bonds are covalent bonds in which the electron density is concentrated above and below the plane of the nuclei of the bonding atoms.
- ⊙ true
- ⊙ false

60) The BrF_5 molecule has polar bonds and has a net dipole moment.
- ⊙ true
- ⊙ false

61) In a correctly balanced equation, the number of reactant molecules must equal the number of product molecules.
- ⊙ true
- ⊙ false

62) The limiting reactant is the reactant with the smallest initial mass.
- ⊙ true
- ⊙ false

63) The empirical formula is the simplest whole number ratio of atoms representing a chemical formula of a molecule.
- ⊙ true
- ⊙ false

64) Many compounds can be represented with the same empirical formula.
- ⊙ true
- ⊙ false

65) There is only one distinct empirical formula for each compound that exists.
- ⊙ true
- ⊙ false

66) The molecular formula is a whole number multiple of the empirical formula.
- ⊙ true
- ⊙ false

67) The percent yield can be determined by dividing the actual yield by the theoretical yield and multiplying this value by 100%.
- ⊙ true
- ⊙ false

68) An electrolyte is a substance that dissolves in water to yield a solution that conducts electricity.
- ⊙ true
- ⊙ false

69) Hydration is the process in which organic solvent molecules surround a solute particle.
- ⊙ true
- ⊙ false

70) Ammonium carbonate is not water-soluble.
- ⊙ true
- ⊙ false

71) Sodium hydroxide is water-soluble.
- ⊙ true
- ⊙ false

72) H_3PO_4 is a strong acid.
- ⊙ true
- ⊙ false

73) The spectator ion is always included in the net ionic equation.
- ⊙ true
- ⊙ false

74) The oxidation number for oxygen in O_2 is zero.
- ⊙ true
- ⊙ false

75) The oxidation number for a pure element is always zero.
- ⊙ true
- ⊙ false

76) The following reaction will occur $Na(s) + AgCl(aq) \rightarrow Ag(s) + NaCl(aq)$
- ⊙ true
- ⊙ false

77) Phenolphthalein is a universal indicator and maybe used as an indicator for all acid-base titrations.
- ⊙ true
- ⊙ false

78) The ripening of fruit, once picked, is an example of physical change.
- ⊙ true
- ⊙ false

79) When applying the scientific method, it is important to avoid any form of hypothesis.
- ⊙ true
- ⊙ false

80) When applying the scientific method, a model or theory should be based on experimental data.
- ⊚ true
- ⊚ false

81) Matter is anything that has mass and occupies space.
- ⊚ true
- ⊚ false

82) The density of a substance is an intensive property.
- ⊚ true
- ⊚ false

83) The volume of a substance is an intensive property.
- ⊚ true
- ⊚ false

84) Boiling point and melting point are extensive properties.
- ⊚ true
- ⊚ false

85) The rusting of a piece of iron under environmental conditions is a physical change.
- ⊚ true
- ⊚ false

86) The number 6.0448, rounded to 3 decimal places, becomes 6.045.
- ⊚ true
- ⊚ false

87) A scoop of vanilla ice cream is a pure substance.
- ⊚ true
- ⊚ false

88) A particular temperature in degrees Celsius is larger than the temperature in kelvins.
- ⊚ true
- ⊚ false

89) Zero kelvin $0\ K < 0°F < 0°C$
- ⊚ true
- ⊚ false

90) 77 K is colder than 4 K.
- ⊙ true
- ⊙ false

91) The juice from an orange is a mixture.
- ⊙ true
- ⊙ false

92) Chemical reactions in a bomb calorimeter occur at constant pressure.
- ⊙ true
- ⊙ false

93) The work done on the surroundings by the expansion of a gas is $w = -P\Delta V$.
- ⊙ true
- ⊙ false

94) The heat absorbed by a system at constant pressure is equal to $\Delta U + P\Delta V$.
- ⊙ true
- ⊙ false

95) In an endothermic process, heat is absorbed by the system.
- ⊙ true
- ⊙ false

96) The enthalpy of vaporization of a compound is always positive.
- ⊙ true
- ⊙ false

97) A home aquarium is an example of an open system.
- ⊙ true
- ⊙ false

98) All elements in their standard state have an enthalpy of formation equal to zero.
- ⊙ true
- ⊙ false

99) ΔH does not depend on the path of a reaction, but ΔU does.
- ⊙ true
- ⊙ false

100) The enthalpy of formation of a liquid is always larger than the enthalpy of formation of the gas of the same compound.
- ⦾ true
- ⦾ false

101) In an endothermic reaction, in going from the reactants to the products at the same temperature, the value of q is negative.
- ⦾ true
- ⦾ false

102) Chemical reactions in a bomb calorimeter occur at constant pressure.
- ⦾ true
- ⦾ false

103) The work done on the surroundings by the expansion of a gas is $w = -P\Delta V$.
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110) The enthalpy of formation of a liquid is always larger than the enthalpy of formation of the gas of the same compound.
- ⊙ true
- ⊙ false

111) In an endothermic reaction, in going from the reactants to the products at the same temperature, the value of q is negative.
- ⊙ true
- ⊙ false

112) Gases form heterogeneous mixtures or solutions with one another.
- ⊙ true
- ⊙ false

113) Gases are compressible and have a density that is much higher than liquids and solids.
- ⊙ true
- ⊙ false

114) When a closed-ended manometer is used for pressure measurements, and the closed end is under vacuum, the level of manometer liquid in the closed arm can never be lower than that in the other arm.
- ⊙ true
- ⊙ false

115) At a temperature of absolute zero, the volume of an ideal gas is zero.
- ⊙ true
- ⊙ false

116) According to the postulates of kinetic molecular theory, the molecules of all gases at a given temperature have the same average speed.
- ⊙ true
- ⊙ false

117) The rate of diffusion of a gas is inversely proportional to its molar mass.
- ⊙ true
- ⊙ false

118) For real gases, $PV > nRT$.
◎ true
◎ false

119) For a gas obeying Boyle's law, a plot of V versus $1/P$ will give a straight line passing through the origin.
◎ true
◎ false

120) Ethanol (C_2H_5–OH) will have a greater viscosity than ethylene glycol (HO–CH_2CH_2–OH) at the same temperature.
◎ true
◎ false

121) The shape of the water-to-glass meniscus results from the strong adhesive forces between glass and water.
◎ true
◎ false

122) Ice is less dense than water due to the formation of hydrogen bonds.
◎ true
◎ false

123) The maximum number of phases of a single substance that can coexist in equilibrium is two.
◎ true
◎ false

124) The surface tension of water is lowered when a detergent is present in solution.
◎ true
◎ false

125) In the packing of identical atoms with cubic unit cells, the packing efficiency increases as the coordination number increases.
◎ true
◎ false

126) Ionic crystals are composed of charged spheres that are held together by covalent bonds.
◎ true
◎ false

127) Solids are generally most stable in crystalline form.
⊙ true
⊙ false

128) A face-centered crystal lattice has one atom in the center of the unit cell.
⊙ true
⊙ false

129) Molecular crystals are held together by the intermolecular forces of dispersion and dipole-dipole forces and by hydrogen bonding.
⊙ true
⊙ false

130) Colligative properties are properties that depend on the number of solvent particles in solution, but not on the nature of the solvent.
⊙ true
⊙ false

131) When a nonvolatile solute is dissolved in a liquid, the vapor pressure exerted by the liquid decreases.
⊙ true
⊙ false

132) An “ideal solution” is a solution that obeys Raoult's law.
⊙ true
⊙ false

133) Colloidal particles may be solids, liquids, or gases.
⊙ true
⊙ false

134) Osmosis is the selective passage of solvent molecules through a porous membrane from a more concentrated solution to a more dilute one.
⊙ true
⊙ false

135) The solubility of gases in water *always* decreases with increasing temperature.
⊙ true
⊙ false

136) The solubility of a solid *always* increases with increasing solvent temperature.
⊙ true
⊙ false

137) A catalyst increases the rate of the reaction and is recovered completely at the end of the reaction.
⊙ true
⊙ false

138) The rate law predicted by the following two-step mechanism is Rate = k[A][B].
A → C + B (slow)
A + B → C + E (fast)
⊙ true
⊙ false

139) The rate of a reaction is determined by the rate of the fastest step in the mechanism.
⊙ true
⊙ false

140) A transition state is a species (or state) corresponding to an energy maximum on a reaction energy diagram.
⊙ true
⊙ false

141) A reaction intermediate is a species corresponding to a local energy maximum on a reaction energy diagram.
⊙ true
⊙ false

142) The rate law cannot be predicted from the stoichiometry of a reaction.
⊙ true
⊙ false

143) The units of the rate constant depend on the order of the reaction.
⊙ true
⊙ false

144) The units of the rate of reaction depend on the order of the reaction.
⊙ true
⊙ false

145) The intermediate in a reaction appears in the mechanism of the reaction and in the overall balanced equation.
- ⊙ true
- ⊙ false

146) The higher the pressure of a gas sample, the greater is its entropy.
- ⊙ true
- ⊙ false

147) The entropy of vaporization of a compound is always positive.
- ⊙ true
- ⊙ false

148) The entropy change $\Delta S°$ at 298 K for the reaction $NH_4Cl(s) \rightarrow NH_3(g) + HCl(g)$ is negative.
- ⊙ true
- ⊙ false

149) All elements in their standard state have standard entropies of formation equal to zero.
- ⊙ true
- ⊙ false

150) The following reaction is spontaneous under standard state conditions at 25°C:
$AgCl(s) \rightarrow Ag^+(aq) + Cl^-(aq)$ ($\Delta G° = 55$ kJ/mol)
- ⊙ true
- ⊙ false

151) $\Delta S_{univ} = -1$ for a spontaneous reaction.
- ⊙ true
- ⊙ false

152) For a given reaction, a change in the temperature may result in a change in the sign of ΔG.
- ⊙ true
- ⊙ false

153) At equilibrium, $\Delta G° = 0$.
- ⊙ true
- ⊙ false

154) As a chemical reaction proceeds toward equilibrium, the free energy of the system decreases at constant temperature and constant pressure.

- ⊙ true
- ⊙ false

155) In living systems, thermodynamically favorable reactions provide the free energy needed to drive necessary but thermodynamically unfavorable reactions.

- ⊙ true
- ⊙ false

156) The reaction $SiO_2(s) + Pb(s) \rightarrow PbO_2(s) + Si(s)$ is spontaneous:

$\Delta G°_f\ (PbO_2(s)) = -217$ kJ/mol

$\Delta G°_f\ (SiO_2(s)) = -856$ kJ/mol

- ⊙ true
- ⊙ false

157) At equilibrium, the rate of the forward reaction is equal to the rate of the reverse reaction.

- ⊙ true
- ⊙ false

158) When the following reaction is at equilibrium

$2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$

then $[NO]^2\ [Cl_2] = K_c\ [NOCl]^2$

- ⊙ true
- ⊙ false

159) The equilibrium constant expression for the reaction

$CuO(s) + H_2(g) \rightleftharpoons Cu(s) + H_2O(g)$ is $K_c = [H_2]/[H_2O]$

- ⊙ true
- ⊙ false

160) If the system $3H_2(g) + N_2(g) \rightleftharpoons 2NH_3(g)$ is at equilibrium and more N_2 is added, a net reaction that consumes some of the added N_2 will occur until a new equilibrium is reached.

- ⊙ true
- ⊙ false

161) When a reaction system reaches equilibrium, the forward and reverse reactions stop.
- ⊙ true
- ⊙ false

162) Changing the amount of reactant or product in an equilibrium reaction will always change the equilibrium position, regardless of the physical state of the substance involved.
- ⊙ true
- ⊙ false

163) For any reaction, if $\Delta G° > 0$, then $K < 1$.
- ⊙ true
- ⊙ false

164) A change in a concentration will not change the position of equilibrium.
- ⊙ true
- ⊙ false

165) A change in the temperature can change the value of the equilibrium constant.
- ⊙ true
- ⊙ false

166) Increasing the temperature of an exothermic reaction causes the equilibrium constant to increase and shifts the equilibrium toward products.
- ⊙ true
- ⊙ false

167) For the reaction of $A + B \rightleftharpoons C + D + \text{heat}$, the reverse reaction is exothermic.
- ⊙ true
- ⊙ false

168) A temperature increase favors an endothermic reaction.
- ⊙ true
- ⊙ false

169) Equilibrium constants are known for the following reactions:

$S(s) + (3/2)O_2(g) \rightleftharpoons SO_3(g)$ $K_c = 9.2 \times 10^{23}$

$SO_3(g) \rightleftharpoons SO_2(g) + (1/2)O_2(g)$ $K_c = 4.8 \times 10^{-4}$

Thus, for the reaction $S(s) + O_2(g) \rightleftharpoons SO_2(g)$, $K_c = 4.4 \times 10^{20}$.

◎ true
◎ false

170) If a strong acid such as HCl is diluted sufficiently with water, the pH will be higher than 7.

◎ true
◎ false

171) Weak acids have weak conjugate bases.

◎ true
◎ false

172) All strong acids have weak conjugate bases.

◎ true
◎ false

173) The stronger the acid, the weaker its conjugate base.

◎ true
◎ false

174) The ammonium ion, NH4+, is a weak acid.

◎ true
◎ false

175) In aqueous solutions at 25°C, the sum of the hydroxide ion and hydronium ion concentrations ([H3O+] + [OH –]) equals 1 × 10–14.

◎ true
◎ false

176) The first ionization constant Ka1 is always smaller than the second ionization constant Ka2 for the ionization of a diprotic acid.

◎ true
◎ false

177) A hydrohalic acid is a binary acid containing a halogen.
◎ true
◎ false

178) NH_3 is a typical Lewis base.
◎ true
◎ false

179) A solution of sodium acetate (CH_3COONa) in water is weakly basic.
◎ true
◎ false

180) $K_w = 1.0 \times 10^{-14}$ under all conditions.
◎ true
◎ false

181) The following is the correct order for the acid strength for these oxoacids. $HClO > HClO_2 > HClO_3 > HClO_4$
◎ true
◎ false

182) Amphoteric oxides exhibit both acidic and basic properties.
◎ true
◎ false

183) Amphoteric oxides are compounds that exhibit both acidic and basic behavior.
◎ true
◎ false

184) The amount of strong acid added to a buffer solution cannot exceed the original amount of conjugate base present in order for the buffer to still work.
◎ true
◎ false

185) A mixture made of 100 mL of 0.5 M CH_3COOH and 100 mL of 0.5 M CH_3COONa is classified as a buffer solution.
◎ true
◎ false

186) Indicators are weak acids that are one color in acidic solution and another color in basic solution.
- ⊙ true
- ⊙ false

187) The pH of a solution that is 0.20 M CH_3COOH and 0.20 M CH_3COONa should be higher than the pH of a 0.20 M CH_3COOH solution.
- ⊙ true
- ⊙ false

188) Increasing the concentrations of the components of a buffer solution will increase the buffer range.
- ⊙ true
- ⊙ false

189) Increasing the concentrations of the components of a buffer solution will increase the buffer capacity.
- ⊙ true
- ⊙ false

190) If the pH of a buffer solution is greater than the p K_a value of the buffer acid, the buffer will have more capacity to neutralize added base than added acid.
- ⊙ true
- ⊙ false

191) The endpoint in a titration is defined as the point when the appropriate indicator changes color.
- ⊙ true
- ⊙ false

192) The endpoint is used to estimate the equivalence point.
- ⊙ true
- ⊙ false

193) A CH_3COOH/CH_3COO^- buffer can be produced by adding a strong acid to a solution of CH_3COO^- ions.
- ⊙ true
- ⊙ false

194) For a conjugate acid-base pair, Kw = Ka/ Kb
- ⊙ true
- ⊙ false

195) Reduction occurs at the anode of a galvanic cell.
- ⊙ true
- ⊙ false

196) At equilibrium E° = 0.
- ⊙ true
- ⊙ false

197) Electrons flow to the cathode in a voltaic cell.
- ⊙ true
- ⊙ false

198) In the electrolyte of an electrochemical cell, current is carried by electrons moving from the anode to the cathode.
- ⊙ true
- ⊙ false

199) A salt bridge allows movement of cations and anions from one half-cell to the other.
- ⊙ true
- ⊙ false

200) $E > 0$ and $\Delta G < 0$ for a spontaneous process.
- ⊙ true
- ⊙ false

201) The Faraday constant represents the charge of 1 mole of electrons.
- ⊙ true
- ⊙ false

202) A SHE has the acid concentration of 1 M and the H2 pressure is 1 atm.
- ⊙ true
- ⊙ false

203) A lead-storage battery is not rechargeable.
- ⊙ true
- ⊙ false

204) Lithium-ion batteries can be recharged many times.
- ⊙ true
- ⊙ false

205) In a fuel cell, an external source of electrical power is used to drive a nonspontaneous reaction in which a fuel is produced.
- ⊙ true
- ⊙ false

206) In a nuclear reaction elements are converted to other elements.
- ⊙ true
- ⊙ false

207) A nuclear reaction's reaction rate is affected by temperature, pressure, and catalysts.
- ⊙ true
- ⊙ false

208) A plot of the number of neutrons versus the number of protons in various isotopes produces a "belt of stability." Isotopes below the belt of stability (i.e., with a smaller neutron-to-proton ratio) decay by beta particle emission.
- ⊙ true
- ⊙ false

209) For stable atoms of elements having low atomic numbers (≤ 20), the neutron-to-proton ratio is close to zero.
- ⊙ true
- ⊙ false

210) All isotopes of elements with atomic numbers higher than 83 (Bi) are radioactive.
- ⊙ true
- ⊙ false

211) Naturally occurring uranium contains approximately 1% 235U and 99% 238U. Of these, the isotope that undergoes fission in a nuclear reactor is U-238.
- ⊙ true
- ⊙ false

212) Alpha decay is not observed for isotopes of elements with atomic numbers less than 83.
- ⊙ true
- ⊙ false

213) Gamma rays are not deflected by an electric field.
- ⊙ true
- ⊙ false

214) Gamma rays are high energy electrons.
- ⊙ true
- ⊙ false

215) An alpha particle is a helium atom.
- ⊙ true
- ⊙ false

216) A beta particle is a proton.
- ⊙ true
- ⊙ false

217) A gamma particle has a charge of –1.
- ⊙ true
- ⊙ false

218) Nuclear fission is the process in which a heavy nucleus (mass number > 200) divides to form smaller nuclei of intermediate mass and one or more protons.
- ⊙ true
- ⊙ false

219) Nuclear fusion is the combination of small nuclei into larger ones.
- ⊙ true
- ⊙ false

220) The wavelengths of light that are absorbed by stratospheric ozone are known to cause cancer.
- ⊙ true
- ⊙ false

221) Ozone is destroyed naturally by the absorption of short–wavelength light.
- ⊙ true
- ⊙ false

222) Mars has an atmosphere made mostly of oxygen.
- ⊙ true
- ⊙ false

223) Jupiter has no solid surface and is 90% hydrogen gas and 9% helium gas.
- ⊙ true
- ⊙ false

224) The air at sea level is ~80% oxygen and ~20% nitrogen.
- ⊙ true
- ⊙ false

225) There is more argon in the air at sea level than there is CO_2.
- ⊙ true
- ⊙ false

226) The gases spewed into the atmosphere when a volcano erupts are N_2, H_2S, HCl, HF, CO_2, and water vapor.
- ⊙ true
- ⊙ false

227) The major contributor to the greenhouse effect is H_2S.
- ⊙ true
- ⊙ false

228) Ethylenediaminetetraacetic acid (EDTA) is an effective antidote for heavy metal poisoning (e.g., Pb2+ and Hg2+).
- ⊙ true
- ⊙ false

229) The correct formula for the dibromobis(oxalato)cobaltate(III) ion is [Co(C2O4)Br2]3+.
- ⊙ true
- ⊙ false

230) The systematic name of the coordination compound K2[Co(H2O)2I4] is potassium diaquatetraiodocobaltate(II).
- ⊙ true
- ⊙ false

231) The oxidation number of Co in [Co(NH3)4Cl2]Cl is +1.

◎ true
◎ false

232) The maximum oxidation state of an element in the first transition series never exceeds its group number.

◎ true
◎ false

233) In complexes of transition metals, the maximum coordination number of the metal is equal to its number of d electrons.

◎ true
◎ false

234) A complex ion that undergoes a very slow exchange reaction is called an inert complex.

◎ true
◎ false

235) Octahedral complexes can exhibit geometric and optical isomerism.

◎ true
◎ false

236)

The systematic name for the hydrocarbon with the following structural formula is 1-ethyl-2-methylbutane.

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◎ true
◎ false

237) Stereoisomers that are mirror images of each other, but are not superimposable, are called optical isomers.
- ⊙ true
- ⊙ false

238) A pair of nonsuperimposable mirror images is called enantiomers.
- ⊙ true
- ⊙ false

239) The reaction of hydrogen chloride gas with propene will yield 1-chloropropane as the main product.
- ⊙ true
- ⊙ false

240) A characteristic reaction of alkanes is addition.
- ⊙ true
- ⊙ false

241) A characteristic reaction of alkenes is addition.
- ⊙ true
- ⊙ false

242) The monomer used to prepare polyvinyl chloride (PVC) is CHCl=CHCl.
- ⊙ true
- ⊙ false

243) A thermoplastic polymer can be melted and reshaped or heated and bent.
- ⊙ true
- ⊙ false

244) Liquid crystals exhibit properties of both liquids and gases.
- ⊙ true
- ⊙ false

245) Liquids are anisotropic because their properties are independent of the axis of testing.
- ⊙ true
- ⊙ false

246) Liquid crystals are anisotropic because the properties they display depend on the direction (orientation) of the measurement.
- true
- false

247) Polystyrene with air or gas blown into the solid is the main component in Styrofoam.
- true
- false

248) Polyethylene consisting primarily of unbranched chains is known as high-density polyethylene (HDPE).
- true
- false

249) A polymer where the monomers are connected by an amide linkage are called polyamines.
- true
- false

250) The monomer for a polyester has the general formula of RCOOR'.
- true
- false

251) Ceramics are usually formed by melting and then solidifying inorganic substances such as clays.
- true
- false

252) Ceramics are polymeric inorganic compounds that have low melting points.
- true
- false

253) Nonmetals are more electropositive than metals.
- true
- false

254) Hydrogen is placed at the top of Group 1 of the periodic table, so it must be a metal.
- true
- false

255) Binary hydrides contain hydrogen and either a metal or nonmetal.
- ⊙ true
- ⊙ false

256) Of the three oxides SiO_2, MgO, and P_4O_{10}, the most acidic oxide is P_4O_{10}.
- ⊙ true
- ⊙ false

257) P_4O_6 and P_4O_{10} are allotropes of phosphorus.
- ⊙ true
- ⊙ false

258) Alkali metal hydrides are very reactive with water, forming H_2 gas.
- ⊙ true
- ⊙ false

259) The chemistry of fluorine differs in many ways from that of the rest of the halogens.
- ⊙ true
- ⊙ false

260) Ionic hydrides do not have exact (stoichiometric) formulas.
- ⊙ true
- ⊙ false

261) The acidity of oxides of main group elements increases across a period from left to right.
- ⊙ true
- ⊙ false

262) The acidity of oxides of main group elements increases down a group, from top to bottom.
- ⊙ true
- ⊙ false

263) The Haber process is the first step in the manufacture of sulfuric acid.
- ⊙ true
- ⊙ false

264) Phosphoric acid (H_3PO_4) is a strong acid.
- ⊙ true
- ⊙ false