42. To compute for Helmholtz free energy (F), which of the following will you need?
I. enthalpy
II. entropy
III. temperature
IV. internal energy

a. II and II
b. I, II, and III
c. II, III and IV X
d. I, II, III and IV

43. Sucrose is a disaccharide composed of ___ and ___.
I. glucose
II. fructose
III. galactose

a. I, I
b. II, II
c. I an II X
d. I and III

44. Which of the following is found in milk?

a. fructose
b. glucose
c. galactose
d. lactose X

45. Parts per million (ppm) is equivalent to:
I. mg/L
II. µg/L
III. µg/mL
IV. ng/mL

a. I and III X
b. II and IV
c. I and IV
d. I and II

50. This is the smallest amount of analyte that can be determined with confidence.

a. detection limit X
b. sensitivity
c. selectivity
d. precision

51. This is the process of establishing the relationship between the amount of analyte and a method's signal.

a. calibration
b. standardization X
c. sampling
d. validation

52. Consider the following reaction

$2A + B \rightleftarrows C + 3D$

What is the equilibrium constant for this reaction given the following information

Reaction 1: $A + B \rightleftarrows D$ $K_1 = 2.0$
Reaction 2: $A + E \rightleftarrows C + D + F$ $K_2 = 1.0$
Reaction 3: $C + E \rightleftarrows B$ $K_3 = 3.0$
Reaction 4: $F + C \rightleftarrows D + B$ $K_4 = 6.0$

a. 4.0 X
b. 5.2
c. 16.0
d. 36.0

53. What is the ionic strength of 1.00 M LiCl?

a. 0.50 M
b. 1.00 M X
c. 2.00 M
d. 4.00 M

78. What is the product for the reaction

benzene (Li, NH_3 (□ iφ))⟶ ?

a. cyclohexene
b. 1,4-cyclohexadiene X
c. benzaldehyde
d. No reaction

79. What is the product for the reaction

methylbenzene ($KMnO_4$)⟶ ?

a. benzenecarboxylic acid X
b. benzenol
c. 1,4-cyclohexadiene
d. No reaction

80. Which of the following does not have an electronic type of excitation?

I. ultraviolet region
II. visible region
III. infrared region

a. I only
b. II only
c. III only X
d. I and II

81. Which of the following is the water quality indicator readily observed by the human eye?

a. pH
b. turbidity X
c. biological oxygen demand
d. temperature

87. This argentometric method used ferric ions.

a. Mohr
b. Volhard X
c. Fajans
d. Karl Fischer

88. This argentometric method used fluorescein and its derivatives.

a. Mohr
b. Volhard
c. Fajans X
d. Karl Fischer

89. Which of the following is the test for the presence of reducing sugars in a sample?

a. Tollen's test
b. Flame test
c. Benedict's test X
d. Sakaguchi test

90. Which of the following is the product of the complete combustion of octane?

a. water X
b. carbon monoxide
c. carbon
d. methane

91. In the laboratory, carbon dioxide is mostly prepared by _____.

a. reacting an acid with a base
b. reacting an acid with a carbonate X
c. reacting a base with a carbonate
d. electrolysis of water

97. Which of the following is the most electronegative element?

a. calcium
b. titanium
c. cesium
d. iron X

98. Which of the following is not a product of the incomplete combustion of a hydrocarbon?

a. carbon dioxide X
b. water
c. carbon monoxide
d. carbon

99. Which of the following is a product of the complete combustion of a hydrocarbon?

a. carbon dioxide X
b. hydrogen
c. carbon monoxide
d. carbon

100. Which of the following will produce oxygen from water?

a. neutralization
b. electrolysis X
c. hydrolysis
d. combustion

101. This reaction will produce salt and water.

a. neutralization X
b. electrolysis
c. hydrolysis
d. combustion

143. A blank contain/s the _____.

I. solvent
II. analyte
III. sample

a. I only X
b. I and II
c. I and III
d. I, II and III

144. Semimicro analysis is performed on samples with masses ranging _____.

a. >0.1 g
b. 0.01 to 0.01 g X
c. 0.0001 to 0.01 g
d. $<10^{-4}$ g

145. A laboratory analyst for a mining company determined that copper is 0.51% of the ore that he is analyzing. Based on these results, copper in that ore is a/n _____.

a. major constituent
b. minor constituent X
c. trace constituent
d. ultratrace constituent

146. A biochemist has a 1000 mg pollen sample. At the most, a _____ analysis can be performed.

a. macro X
b. semimicro
c. micro
d. ultratrace

147. Amphiprotic species

I. has both acidic and basic properties
II. has both a positive and negative charge
III. is a buffer solution

a. I only X
b. II only
c. III only
d. I, II and III

148. All of the following are characteristics of an ideal precipitating reagent EXCEPT _____.

I. easily filtered and washed free of contaminants
II. of sufficiently low solubility that no significant loss of the analyte occurs during filtration and washing
III. reactive with constituents of the atmosphere
IV. of known chemical composition after it is dried

a. II only
b. III only X
c. I, II and III
d. I, II, III and IV

149. In a galvanic cell, oxidation occurs at the _____.

I. cathode
II. anode
III. salt bridge

a. I only
b. II only X
c. I and II
d. I, II and III

150. In an electrolytic cell, reduction occurs at the _____.

I. cathode
II. anode
III. salt bridge

a. I only X
b. II only
c. I and II
d. I, II and III

151. A car battery is an example of all of the following EXCEPT for _____.

I. galvanic cell
II. electrolytic cell
III. electrochemical cell
IV. voltaic cell

a. I only
b. II only X
c. I, II and III
d. I, II, III and IV

152. A reference electrode in potentiometry has _____.

I. known and constant electrode potential
II. unknown and constant electrode potential
III. varying electrode potential depending on the analyte

a. I only X
b. III only
c. II and III
d. I, II, and III

188. Hemiketals are formed when

I. ketones react with alcohols
II. aldehydes react with alcohols
III. carboxylic acids react with alcohols

a. I only X
b. II only
c. I and II
d. Ii and III

189. An _____ molecule has both hydrophobic and hydrophilic parts.

I. amphiprotic
II. amphipatic
III. amphoteric

a. I only
b. II only X
c. I and II
d. II and III

190. When a tetrahedral carbon can be converted to a chiral center by changing only one of the attached groups, it is referred to as _____.

I. prochiral
II. anomeric
III. enantiomeric

a. I only X
b. II only
c. I and III
d. II and III