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1 What is the quantum of light called?

- a. the amplitude
- b. the frequency
- c. a photon
- d. the wavelength

2 The first law of thermodynamics

- a. defines chemical energy
- b. defines entropy
- c. is a statement of conservation of energy
- d. provides a criterion for the spontaneity of a reaction

3 The normal boiling point occurs when the

- a. intermolecular forces within the liquid phase are broken
- b. temperature of the pure liquid equals the external temperature
- c. vapor pressure of a pure liquid equals an external pressure of one atmosphere
- d. vapor pressure of the liquid equals the external pressure

5 Which subatomic particle has the smallest mass?

- a. a proton
- b. a neutron
- c. an electron
- d. an alpha particle

6 How many lone pairs of electrons are on the P atom in PF₃?

- a. 0
- b. 1
- c. 2
- d. 3

7 Which is not a solution?

- a. brass
- b. fog
- c. hydrochloric acid
- d. wine

9 Of the following, which element has the highest first ionization energy?

- a. aluminum
- b. magnesium

- c. silicon
- d. sodium

10 The reaction of $\text{Cu}(s) + 2 \text{AgNO}_3(aq) \rightarrow \text{Cu}(\text{NO}_3)_2(aq) + 2 \text{Ag}(s)$ is best classified as a(n)

- a. acid-base neutralization reaction
- b. double replacement reaction
- c. oxidation-reduction reaction
- d. precipitation reaction

11 Which two ions have the same electron configuration in the ground state?

- a. Rb^+ and Cs^+
- b. Ba^{2+} and I^- .
- c. Se^{2+} and I^- .
- d. Fe^{2+} and Fe^{3+}

12 Which of the following mixtures have components which can be separated by filtration?

- a. colloids
- b. solutions
- c. suspensions
- d. all of the above

13 When 200. mL of 0.150 M of hydrochloric acid is added to 125 mL of 0.175 M $\text{Mg}(\text{OH})_2$, the resulting solution will be

- a. acidic
- b. basic
- c. neutral
- d. it is impossible to tell from the information given

14 The average osmotic pressure of blood is about 7 atm. Therefore,

- a. the average blood pressure is about 7 atm
- b. the average pressure inside the body is about 7 atm above the external pressure
- c. a pressure of about 7 atm would be required to prevent osmosis of blood is in contact with pure water across a semipermeable membrane
- d. all of the above are true

15 Which statement about elemental analysis by combustion is not correct?

- a. carbon is determined from the amount of CO_2 formed
- b. hydrogen is determined from the amount of H_2O formed
- c. Oxygen is determined from the amount of H_2O formed
- d. Only carbon and hydrogen can be determined directly from CO_2

and H₂O

16 When K₂SO₄(aq) and Pb(NO₃)₂(aq) are mixed, a white colored precipitate forms which is

- a. KNO₃
- b. K₂SO₃
- c. Pb
- d. PbSO₄

17 Which of the following have the same number of valence electrons?

- a. K, As, Br
- b. B, Si, As
- c. N, As, Bi
- d. He, Ne, F

18 Gaseous elements characterized by low reactivity are found in group _____ of the periodic table.

- a. 5A
- b. 6A
- c. 7A
- d. 8A

19 Which element has the highest first electron affinity?

- a. B
- b. C
- c. Li
- d. N

20 What geometric arrangement of charge clouds is expected for an atom that has five charge clouds?

- a. tetrahedral
- b. square planar
- c. trigonal bipyramidal
- d. octahedral

21 Two aqueous solutions, A and B, are separated by a semipermeable membrane. The osmotic pressure of solution A immediately begins to decrease. Which of the following statements is true?

- a. solvent molecules are moving from solution B into solution A
- b. the initial osmotic pressure of solution B is greater than that of solution A
- c. the solvent molecules are moving from the solution of higher osmotic pressure to that of lower osmotic pressure
- d. both B and C are true statements

22 What is the stoichiometric coefficient for oxygen when the following

equation is balanced using the lowest, whole-number coefficients
 $\underline{\hspace{1cm}} \text{C}_3\text{H}_8\text{O}(l) + \underline{\hspace{1cm}} \text{O}_2(g) \rightarrow \underline{\hspace{1cm}} \text{CO}_2(g) + \underline{\hspace{1cm}} \text{H}_2\text{O}(l)$

- a. 3
- b. 5
- c. 7
- d. 9

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