Chemistry
CST Practice

1. Compared to the charge and mass of a proton, an electron has

a) the same charge and a smaller mass
b) the same charge and the same mass
c) an opposite charge and a smaller mass
d) an opposite charge and the same mass

2. When alpha particles are used to bombard gold foil, most of the alpha particles pass through undeflected. This result indicates that most of the volume of a gold atom consists of ____.

a) deuterons
b) neutrons
c) protons
d) unoccupied space

3. When electrons in an atom in an excited state fall to lower energy levels, energy is

a) absorbed, only
b) released, only
c) neither released nor absorbed
d) both released and absorbed

4. Which three groups of the Periodic Table contain the most elements classified as metalloids (semimetals)?

a) 1, 2, and 13
b) 2, 13, and 14
c) 14, 15, and 16
d) 16, 17, and 18

5. When a metal atom combines with a nonmetal atom, the nonmetal atom will

a) lose electrons and decrease in size
b) lose electrons and increase in size
c) gain electrons and decrease in size
d) gain electrons and increase in size

6. Which set of elements contains a metalloid?

a) K, Mn, As, Ar
b) Li, Mg, Ca, Kr
c) Ba, Ag, Sn, Xe
d) Fr, F, O, Rn

7. Which of the following is a binary compound?

a) hydrogen sulfide
b) hydrogen sulfate
c) ammonium sulfide
d) ammonium sulfate

8. Given the unbalanced equation: $Al + O_2 = Al_2O_3$ When this equation is completely balanced using the smallest whole numbers, what is the sum of the coefficients?

a) 9
b) 7
c) 5
d) 4

9. What is the empirical formula of the compound whose molecular formula is P_4O_{10}?

a) PO
b) PO_2
c) P_2O_5
d) P_8O_{20}

10. Which of the following is a binary compound?

a) potassium chloride
b) ammonium chloride
c) potassium chlorate
d) ammonium chlorate

11. Which is the correct formula for nitrogen (1) oxide?

a) NO
b) N_2O
c) NO_2
d) N_2O_3

12. Which combination of atoms can form a polar covalent bond?

a) H and H
b) H and Br
c) N and N
d) Na and Br

13. A strontium atom differs from a strontium ion in that the atom has a greater

a) number of electrons
b) number of protons
c) atomic number
d) mass number

14. Which bond has the greatest ionic character?

a) H---CL
b) H---F
c) H---O
d) H---N

15. Which gas is monatomic at STP?

a) chlorine
b) fluorine
c) neon
d) nitrogen

16. What Kelvin temperature is equal to 25°C?

a) 248 K
b) 298 K
c) 100 K
d) 200 K

17. When the external pressure is 101.3 kPa, water will boil at what temperature?

a) 12.8°C
b) 14.5°C
c) 100°C
d) 18°C

18. As ice cools from 273 K to 263 K, the average kinetic energy of its molecules will

a) decrease
b) increase
c) remain the same
d) can not be determined from the information given.

19. The phase change represented by the equation I_2 (s) ----> I_2 (g) is called

a) sublimation
b) condensation
c) melting
d) boiling

20. The heat of fusion is defined as the energy required at constant temperature to change 1 unit mass of a

a) gas to a liquid
b) gas to a solid
c) solid to a gas
d) solid to a liquid

21. When a catalyst is added to a system at equilibrium, a decrease occurs in the

a) activation energy
b) heat of reaction
c) potential energy of the reactants
d) potential energy of the products

22. Which statement describes characteristics of an endothermic reaction?

a) The sign of H is positive, and the products have less potential energy than the reactants.
b) The sign of H is positive, and the products have more potential energy than the reactants.
c) The sign of H is negative, and the products have less potential energy than the reactants.
d) The sign of H is negative, and the products have more potential energy than the reactants.

23. Which statement explains why the speed of some chemical reactions is increased when the surface area of the reactant is increased?

a) This change increases the density of the reactant particles.
b) This change increases the concentration of the reactant.
c) This change exposes more reactant particles to a possible collision.
d) This change alters the electrical conductivity of the reactant particles.

24. Which conditions will increase the rate of chemical reaction?

a) decreased temperature and decreased concentration of reactants?
b) decreased temperature and increased concentration of reactants?
c) increased temperature and decreased concentration of reactants?
d) increased temperature and increased concentration of reactants?

25. Which element is present in all organic compounds?

a) carbon
b) nitrogen
c) oxygen
d) phosphorous

26. In a molecule of CH_4, the hydrogen atoms are spatially oriented toward the centers of a regular

a) pyramid
b) tetrahedron
c) square
d) rectangle

27. A battery consists of which type of cells?

a) electrolytic
b) electrochemical
c) electroplating
d) electromagnetic

28. Which type of reaction is occurring when a metal undergoes corrosion?

a) oxidation-reduction
b) neutralization
c) polymerization
d) saponification

29. Given the reaction for the nickel-cadmium battery:
$2NiOH + Cd + 2H_2O \rightarrow 2Ni(OH)_2 + Cd(OH)_2$
What species is oxidized during the discharge of the battery?

a) Ni3+
b) Ni2+
c) Cd
d) Cd2+

30. Which formula represents a salt?

a) KOH
b) KCl
c) CH3OH
d) CH3COOH

31. Which substance can be classified as an Arrhenius acid?

a) HCl
b) NaCl
c) LiOH
d) KOH

32. An acidic solution could have a pH of

a) 7
b) 10
c) 3
d) 14

33. What is the pH of a 0.00001 molar HCl solution?

a) 1
b) 9
c) 5
d) 4

34. When HCl(aq) is exactly neutralized by NaOH(aq), the hydrogen ion concentration in the resulting mixture is

a) always less than the concentration of the hydroxide ions
b) always greater than the concentration of the hydroxide ions
c) always equal than the concentration of the hydroxide ions
d) sometimes greater and sometimes less than the concentration of the hydroxide ions

35. A student wishes to prepare approximately 100 milliliters of an aqueous solution of 6M HCl using 12 M HCl. Which procedure is correct?

a) adding 50 mL of 12 M HCl to 50 mL of water while stirring the mixture steadily.
b) adding 50 mL of 12 M HCl to 50 mL of water and then stirring the mixture steadily.
c) adding 50 mL of water to 50 mL of 12 M HCl while stirring the mixture steadily.
d) adding 50 mL of water to 50 mL of 12 M HCl and then stirring the mixture steadily.