Chemistry Semester Test (a): **Name_____**
Chapters 1-6 **Period:**
Write the letter of the best answer in the space provided.

1.___ Low electrical conductivity is a property of:
A. ions in solutions B. metals C. molten salts D. molecular compounds

2.____ Of the following statements about covalent bonds, only ____ is true**:**
A. covalent bonds are flexible, like springs
B. protons from each atom are attracted to each other
C. two electrons spinning in opposite directions have more repulsion
D. covalent bonds form due to charge differences on atoms

3.____ The attractions that exist between molecules are:

A. covalent bonds B. intermolecular forces C. ionic bonds D. none of these

4.____ The name of P_20_5 is:
A. phosphorus oxide B. potassium oxide
C. dipotassium pentoxide D. diphosphorous pentoxide

5.____ When two atoms bond covalently their energy ____ and stability _____.

A. decreases, increases B. increases, decreases
C. increases, increases D. decreases, decreases

6.____ Substances that are nonpolar:
A. have very little attraction for one another B. tend to have high boiling points
C. are attracted to each other D. all of the above

7. ____ Oxygen has an electronegativity value of 3.5 and hydrogen's EN value is 2.1. If these two atoms bond:
A. hydrogen will attract electrons from oxygen B. electrons will be evenly shared
C. oxygen will attract electrons from hydrogen D. they form an ionic bond

8. ____ Which of the following molecules contains three covalent bonds?
A. O_2 B. Cl_2 C. CH_4 D. NH_3

9. ____ The energy that is contained in a bond between atoms is _____ energy.
A. kinetic B. nuclear C. valence D. potential

10. ____ Bond strength between two covalently bonded atoms generally increases as bond length ____ and bond energy _____.
A. increases, decreases B. increases, increases
C. decreases, increases D. decreases, decreases

11. ____ Lewis structures are not generally used to represent ionic compounds because:
A. ionic compounds are nonpolar B. ionic compounds do not share electrons
C. ionic compounds do not have valence electrons D. all of the above

12. ____ A good measure of intermolecular forces is:
A. reactivity B. conductivity C. melting point D. bond length

13. ____ Organic chemistry is:
A. the study of diamond and graphite B. study of living organisms
C. the study of carbon containing compounds D. the study of C, H, and 0

14. ____ A nonpolar covalent bond is formed by:
A. two atoms that share electrons unequally B. opposite charges attracting
C. two atoms that share electrons equally D. two atoms with large EN differences

15. ____ The types of bonds that are broken when a covalent substance melts are:
A. covalent B. ionic C. molecular D. intermolecular

16. ____ The bonds with the highest bond energy (therefore strongest) are:
A. triple bonds B. double bonds C. hydrogen bonds D. single bonds

17. ____ The simplest unit of matter that still retains the properties of the substance is the:
A. electron B. neutron C. atom D. mole

18. ____ H_2O (water) would be considered a(n):
A. atom B. ion C. element D. molecule

19. ____ One would expect chemists to:
A. discover new materials
B. predict what a new material might be like
C. investigate the structure and properties of matter
D. all of these

20. ____ When one gram of hydrogen burns in eight grams of oxygen, nine grams of water are formed. This would be an example of conservation of
A. matter B. energy
C. mass-energy D. inertia

21. ____ All matter has:
A. mass B. kinetic energy
C. inertia D. both mass and inertia

22.____ The unit of _____ in the SI system is kilogram.
A. time B. temperature C. mass D. length

23. ____ The process of water turning from a liquid to a gas is an example of a ____ change.
A. chemical B. physical C. nuclear D. all of the above

24. ____ What is one characteristic common to all elements in group 1?
A. all are nonmetals B. all form ions with a plus one charge
C. all have high electronegativities D. they gain electrons when forming bonds

25. ____ The freezing point of water is O°C and the boiling point of water is 1OO°C. To convert water vapor in air to snow, the temperature needs to be:
A. above 1OO°C B. between 4°C and 100°
C. at 4°C D. at or below O°C

26. ____ How many significant digits are in 900.1?
A. one B. two C. three D. four

27. ____ Atoms that have a high electronegativity would:
A. have a large atomic mass B. attract electrons to themselves when bonded
C. contain a high number of neutrons D. attract other atoms to themselves

28. ____ The two most general classifications of substances is either _____ or compounds.
A. elements B. solutions C. mixtures D. heterogeneous mixtures

29. ____ Ionic substances are composed of:
A. atoms that share electrons B. metals and nonemtals C. salts D. nonmetals

30. ____ The molar mass of hydrogen peroxide (H_2O_2) is:
A. 2.00g /mol B. 16.0g /mol C. 18.Og /mol D. 34.Og/mol

31. ____ Avogadros number (6.02×10^{23}) is the number of ____ in one mole of a substance.
A. atoms B. grams C. molecules D. atoms or molecules

32. ____ The movement of which subatomic particle is responsible for the production of light?
A. electron B. proton C. neutron D. none of the above

33. ____ When an atom is in its normal state (not in a compound), the number of protons must equal:
A. mass number B. mass number and atomic number
C. number of electrons D. group number

34. ____ When an atom is in it's normal state, the atom is:
A. positively charged B. neutral C. negatively charged D. any of the above

35. ____ In Rutherford's model of an atom, most of the mass of the atom:
A. was evenly distributed throughout the atom B. was located in electron orbits

C. was located in the nucleus D. was contained in neutrons

36. ____ Atoms combine with other atoms in order to:
A. achieve stability B. obtain an octet
C. decrease their energy D. all of the above

37. ____ Shiny, ductile, good conductors of electricity and heat are classified as:
A. metals B. nonmetals C. metalloids D. noble gases

38. ____ An element with seven electrons in its outer energy level would be a:
A. metal B. nonmetal C. metalloid D. noble gas

39. ____ Elements in vertical groups have similar properties because of similar:
A. nuclear configurations B. principal quantum numbers
C. outer electron configurations D. mass numbers

40. ____ Which of the following elements would be most similar to each other?
A. Li and Rb B. C and N C. C and Si D. Na and C

41. ____ Atoms are most stable when they have ____ electrons in their outer energy level.
A. four B. two C. eight D. six

42.____ The bond energy for the molecule described by figure 6-1 is:
A. 70 kJ/mol B. 347 kJ/mol C. 154 pm D. 290 pm

43.____ The amount of energy required to break the bond holding together the atoms in Figure 6-1 is:
A. 70 kJ/mol B. 347 kJ/mol C. 154 pm D. 290 pm

Write the correct name or formula of the following compounds and whether the substance is ionic or covalent in the space provided.

1.$CC1_4$_____ 2.KF_____

3.N_20_5_____ 4.potassium chloride_____

5.lead(II) phosphate_____ 6.sulfur trioxide_____

For each of the following compounds, draw the Lewis dot structure, determine the shape, determine the bond and molecular polarity, and the type of intermolecular forces.

1. H_2S

2. CH_3F

3. CS_2

4. O_2

Answer the following questions in complete sentences.

1. Differentiate between ionic and covalent bonding. How do the properties of covalent compounds differ from those of ionic compounds (at least two.)

2. How do the electronegativity differences of two bonded atoms effect polarity? Contrast the properties of polar and nonpolar substances.

3. What is the octet rule and what is it's significance in the formation of compounds?

4. Explain how light is produced.

5. Describe the modern atomic model. Include the properties of the particles that make up the atom and their locations. Imagine the atom is chlorine-36, how many protons, neutrons, and electrons does the atom contain?

Complete the following problems. Show all work, label your problem and answers completely, and use the correct number of significant digits to receive full credit.

1. Calculate the molar mass of $Ce_2 (CO_3)_3$

2. How many moles of MgO are in .683g of MgO?

3. Calculate the number of grams in 3.85 moles of CF_4.

4. What is the percentage (by masss) of potassium and chlorine in potassium chloride?

5. Write the electron configurations of the following elements.

a. Zn_____

b.Ca_____

6. Write the nuclear reaction for the beta decay of radon-222.

7. An alpha particle collides and fuses with carbon-12 emitting gamma radiation. Write the balanced nuclear reaction for this process.