| Chemistry Chapters | v Semester Test (a): 1-6 | | Name Period: | |
|--------------------------------|--|--|--|--|
| Write the | letter of the best answer | in the space pro | vided. | |
| 1Low A. | v electrical conductivity is it is i | a property of: netals C. molte | n salts D. molect | ılar compounds |
| 2 Of A. B. C. D. | the following statements a covalent bonds are flexib protons from each atom a two electrons spinning in covalent bonds form due | bout covalent bo le, like springs are attracted to ea opposite direction to charge differe | nds, only is truch other ons have more repul nces on atoms | ue: sion |
| 3 Th | e attractions that exist betw | ween molecules a | are: | |
| A. | covalent bonds B. inte | ermolecular force | s C. ionic bond | ds D. none of these |
| 4 Th A. C. | e name of P ₂ 0 ₅ is: phosphorus oxide dipotassium pentoxide | E L | potassium oxide diphosphorous per per se se | entoxide |
| 5 W | hen two atoms bond covale | ently their energy | and stability | |
| <mark>A.</mark> C. | decreases, increases increases, increases | B D | increases, decreas decreases, decreas | ses ses |
| 6 Sul <mark>A.</mark> C. | ostances that are nonpolar: have very little attraction f are attracted to each other | or one another E | B. tend to have highD. all of the above | boiling points |
| 7. <u> </u> | xygen has an electronegati | vity value of 3.5 | and hydrogen's EN | value is 2.1. If these |
| A. <mark>C.</mark> | hydrogen will attract elect oxygen will attract electro | trons from oxyge ons from hydroge | n B. electrons n D. they form | will be evenly shared an ionic bond |
| 8 W | hich of the following mole A. O_2 B. Cl_2 | cules contains th C. CH ₄ | ree covalent bonds? D. NH3 | , |
| 9 T | he energy that is contained A. kinetic B. nucl | in a bond betwee ear C. valer | en atoms is e nce <mark>D.</mark> potential | nergy. |
| 10 E length | ond strength between two and bond energy | covalently bonde | ed atoms generally i | ncreases as bond |
| A. in <mark>C.</mark> de | acreases, decreases ecreases, increases | B. D. | increases, increases decreases, decrease | S |

| 11 Lewis structures are not generally used to rep A. ionic compounds are nonpolar B. C. ionic compounds do not have valence electron | oresent ionic compounds because: ionic compounds do not share electrons rons D. all of the above | | | |
|---|--|--|--|--|
| 12. A good measure of intermolecular forces is: A. reactivity B. conductivity C. melting | g point D. bond length | | | |
| 13 Organic chemistry is: A. the study of diamond and graphite C. the study of carbon containing compounds | B. study of living organisms D. the study of C, H, and 0 | | | |
| 14 A nonpolar covalent bond is formed by: A. two atoms that share electrons unequally C. two atoms that share electrons equally | B. opposite charges attracting D. two atoms with large EN differences | | | |
| 15 The types of bonds that are broken when a co A. covalent B. ionic C. molecula | valent substance melts are: ar <mark>D.</mark> intermolecular | | | |
| 16 The bonds with the highest bond energy (thereA. triple bondsB. double bonds | efore strongest) are: C. hydrogen bonds D. single bonds | | | |
| 17 The simplest unit of matter that still retains thA. electronB. neutronC. atom | ne properties of the substance is the: D. mole | | | |
| 18. $_\H_2O$ (water) would be considered a(n):A. atomB. ionC. element | <mark>D.</mark> 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 grformed. This would be an example of conservation ofA. matterC. mass-energyD. inergy | rams of oxygen, nine grams of water are ergy rtia | | | |
| 21 All matter has:A. massC. inertiaD. bot | etic energy th mass and inertia | | | |
| 22 The unit of in the SI system is kilogram A. time B. temperature | n. <mark>C.</mark> mass D. length | | | |

| 23 | The process of water turning from a liquid to a gas is an example of a change.A. chemicalB. physicalC. nuclearD. all of the above |
|-----|---|
| 24 | What is one characteristic common to all elements in group 1?A. all are nonmetalsB. all form ions with a plus one chargeC. all have high electronegativitiesD. they gain electrons when forming bonds |
| 25 | The freezing point of water is O°C and the boiling point of water is 100°C. To convert water vapor in air to snow, the temperature needs to be: A. above 100°C B. between 4°C and 100° C. at 4°C D. at or below 0°C |
| 26 | How many significant digits are in 900.1?A. oneB. twoC. threeD. four |
| 27 | Atoms that have a high electronegativity would:A. have a large atomic massB. attract electrons to themselves when bondedC. contain a high number of neutronsD. 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. 18.0g /mol D. 34.0g/mol |
| 31 | Avogadros number (6.02×10^{23}) is the number of in one mole of a substance.A. atomsB. gramsC. moleculesD. atoms or molecules |
| 32 | The movement of which subatomic particle is responsible for the production of light?A. electronB. protonC. neutronD. 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 numberB. mass number and atomic numberC. number of electronsD. group number |
| 34 | When an atom is in it's normal state, the atom is: A. positively charged <mark>B.</mark> 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 | Į | D. all of the above | | |
| 37 | Shiny, ductile, good co | onductors of electric | tity and heat are clas | sified as: | |
| | A. metals | B. nonmetals | C. metalloids | D. noble gases | |
| 38. | An element with sever | n electrons in its out | er energy level wou | ld be a: | |
| | A. metal B. | nonmetal | C. metalloid | D. noble gas | |
| 39 | Elements in vertical g | roups have similar p | properties because of | similar [.] | |
| <u> </u> | A. nuclear configuration | 18 | B. principal a | uantum numbers | |
| | C. outer electron config | urations | D. mass nur | nbers | |
| 40 | Which of the followin | a elements would be | e most similar to eac | ch other? | |
| 40 | Which of the followin A Li and Rh | B C and N | $\frac{C}{C}$ C and Si | D Na and C | |
| | A. Li alla Ko | D. C and N | C. C and Si | D. Na and C | |
| 41 | Atoms are most stable | e when they have | electrons in their | outer energy level. | |
| | A. four | B. two | <mark>C.</mark> eight | D. six | |
| | | | | | |

| 42. The bond energy $42.$ | y for the molecule describes $B_{\rm r} = 347 \rm k I/mol$ | ribed by figure 6-1 is $C = 154$ pm | S: D 290 pm | | |
|--|---|-------------------------------------|------------------------|--|--|
| A. /0 KJ/1101 | $\mathbf{D}, \mathbf{J} + 7 \mathbf{K} \mathbf{J} / \mathbf{H} \mathbf{O} \mathbf{I}$ | C. 154 pili | D. 270 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.CC14carbon tetrachloride | | 2.KFpotass | 2.KFpotassium flouride | | |
| 3.N ₂ 0 ₅ dinitrogen pen | toxide | 4.potassium ch | lorideKCl | | |
| 5.lead(II) phosphatePb ₃ (PO ₄) ₂ | | 6.sulfur trioxide | SO3 | | |

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. H₂S Bent, polar bond, polar molecule, dipole 2. CH₃F tetrahedral, C-H nonpolar, C-F polar, polar molecule

3. CS₂ Linear, polar bond, nonpolar cule, dispersion

4. O₂ linear, nonpolar bond, nonpolar cule, dispersion

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.)

Ionic compounds form by the transfer of electrons from metal to nonmetal forming oppositely charged ions which attract forming a crystal lattice. Covalent compounds form by two or more nonmetals attracting the same electrons forming individual molecules. Covalent compounds tend to have lower MP and BP, are nonconductors, tend to be soft or flexible. Ionic substances conduct when dissolved or molten, are hard and brittle and have higher MPand BP.

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

A small ENDiff. (about 0-.4) results in equal electron sharing, typically when the same two atoms bond, and are nonpolar; nonpolar substances have dispersion forces so very low MP/BP. An END between .4-1.7 results in uneven electron sharing and polar covalent bonds, typically when two different nonmetals bond. Exhibit dipole forces or possibly H-bonds and have higher MP/BP than nonpolar substances.

3. What is the octet rule and what is it's significance in the formation of compounds? Atoms gain, lose or share electrons to achieve 8 valence electrons (a full s and p sublevel.) Atoms bond with each other in a manner to achieve a stable octet which results in greater stability.

4. Explain how light is produced.

Electrons must gain energy and move up one or more energy levels (to an excited state) which is not stable so the electron will release the energy as light (photons) when they return to a lower energy level.

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?

An atom is mostly empty space with protons and neutrons in a tiny, dense nucleus that contains the mass of an atom and electrons around the nucleus in an electron cloud. Chlorine-36 17 protons, 17 electrons, 19 neutrons

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 (CO₃)₃

460.2g/mol

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

.0169mol

3. Calculate the number of grams in 3.85 moles of CF₄.

338.8 g

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

47.6% Cl 52.4% K

- 5. Write the electron configurations of the following elements.
 - a. $Zn_{1s}^{2}2s^{2}2p^{6}3s^{2}3p^{6}4s^{2}3d^{10}$ _____

b.Ca_1s²2s²2p⁶3s²3p⁶4s²_____

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

 222 Rn \rightarrow $^{1-}$ ₀e + 222 Fr

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

 $^{4}_{2}\text{He} + ^{12}\text{C} \rightarrow ^{16}\text{O} + \gamma$