

Name _____

Chemistry 1A Spring 2008

Exam 1 Chapters 1-4

Electronegativities

H 2.2							
Li 0.98	Be 1.57	B 2.04	C 2.55	N 3.04	O 3.44	F 3.98	
Na 0.93	Mg 1.31	Al 1.61	Si 1.9	P 2.19	S 2.58	Cl 3.16	
K 0.82	Ca 1.0	Ga 1.81	Ge 2.01	As 2.18	Se 2.55	Br 2.96	
Rb 0.82	Sr 0.95	In 1.78	Sn 1.96	Sb 2.05	Te 2.1	I 2.66	Xe 2.6
Cs 0.79	Ba 0.89	Tl 2.33	Pb 2.02	Bi 2.0	Po 2.2		

Substance	Density in g/mL
battery acid	1.29
benzene, C ₆ H ₆	0.879
blood (whole)	1.05
bromine, Br ₂	3.12
chocolate	1.75
copper, Cu	8.94
chromium(III) oxide, Cr ₂ O ₃	5.2
gasoline	0.7025
gold, Au	19.0
Iron, Fe	7.87
magnesium, Mg	1.74
nitrobenzene, C ₆ H ₅ NO ₂	1.20
oleic acid	0.895
phosphorus oxychloride, POCl ₃	1.675
sulfuric acid (concentrated)	1.84
water at 20 °C	0.997

Answer the following by writing the word, words, letter, letters or number in each blank that best completes each sentence. (1½ point each blank unless stated otherwise)

1. A(n) _____ mixture is a mixture with two or more phases.
2. _____ means on the order of the size of atoms.
3. _____ are the elements that have some but not all of the characteristics of metals.
4. The accepted SI standard for amount of substance is the _____, which has an abbreviation of _____.
5. The accepted SI base unit for energy is the _____, which has an abbreviation of _____. (2 points)
6. The elements in group 1 on the periodic table are called _____.
7. The SI (metric) prefix associated with 10^{-12} is _____, which has an abbreviation of _____. (2 points)
8. The common units associated with the density of gases are _____.
9. The bond between a carbon atom and an oxygen atoms is _____ (nonpolar covalent, polar covalent, or ionic).
10. In the H-F polar covalent bond, the _____ is partial positive, and the _____ is partial negative. (2 points)
11. A(n) _____ is an ion formed from an atom that has lost one or more electrons and thus has become positively charged.
12. _____ is the number of protons in an atom's nucleus. It establishes the element's identity.
13. A(n) _____ is an ionic compounds with water molecules trapped within the crystal lattice.
14. A(n) _____ is a polyatomic ions with the general formula $H_aX_bO_c^{d-}$. (The a can be 0.)
15. _____ are hydrocarbons (compounds composed of carbon and hydrogen) in which all of the carbon-carbon bonds are single bonds.

16. Draw a reasonable Lewis structure for C_2H_3F . (4 points)

17. Draw Lewis structures for all of the constitutional isomers of C_4H_{10} . (4 points)

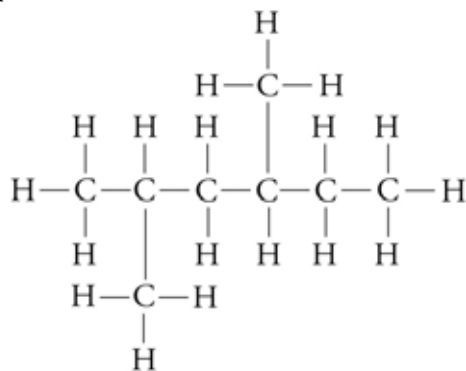
18. Identify each of the following as a binary covalent compound, a binary ionic compound, a binary acid, an ionic compound with a polyatomic ion, an oxyacid, an alcohol, or a sugar. Write name for each. (8 points)

Chemical Formula	Type of Substance	Name
NF_3		
$Mg(H_2PO_2)_2$		
$Cr(CN)_3$		
$HClO_4$		

19. Identify each of the following as a binary covalent compound, a binary ionic compound, a binary acid, an ionic compound with a polyatomic ion, an oxyacid, an alcohol, or a sugar. Write formula for each.) (8 points)

Chemical Formula	Type of Substance	Formula
hydrogen iodide		
ferrous sulfite		
ethanol		
hydrosulfuric acid		

20. The name that corresponds to the following structure is _____.
(3 points)



21. Write a complete, balanced equation for the combustion of solid amino acid methionine, $\text{C}_5\text{H}_{11}\text{NSO}_2$. (6 points)

22. Complete the following table by (1) writing the name for the type of particle viewed as forming the basic structure of each of the following substances and (2) writing the name of the type of attraction that is broken when these substances are melted or boiled, e.g. covalent bonds, dipole-dipole attractions, etc. (1 point each box)

Substance	Particles to Visualize	Type of Attraction
C_6H_{14}		
CH_3NH_2		
hydrogen chloride		
chlorine		
carbon in the diamond form		
xenon		
NaNO_3		
manganese		

For the following numerical problems, be sure to carefully show your work and round of your answer correctly. NOTE: To maximize your part credit, even if you cannot do all of a problem, be sure to set up as much of it as you can. (7 points each)

23. Phosphorus oxychloride, POCl_3 , is a colorless, fuming liquid used to make gasoline additives. What mass of chlorine in megagrams is contained in 4.765 m^3 of POCl_3 ?

24. The FeS_2 found in pyrite ore is a source of sulfur for the production of sulfuric acid. The following equation describes the first step in this process.



How many kilograms of pyrite ore that is 92.6% FeS_2 are necessary to produce 48.95 pounds of iron(III) oxide, Fe_2O_3 in the first step of this process?

Answer the following in short answer form.

25. Write a description of the element nitrogen as it is found at room temperatures and pressures. Your description should include mention of the particles that form its structure, whether it's a gas, liquid, or solid, how the particles are moving, how much space they occupy, and the strengths of attractions between the particles.

26. Write an explanation for why an excess of one or more of the reactants are added in a chemical reaction and explain why other reactants are limiting.