Chemistry 400: General Chemistry
Sacramento City College
HW#1: Review to Begin Chemistry 400[1]

Review of Chapter 1

1. Identify a liquid.
    a. definite volume and definite shape
    b. definite volume and no definite shape
    c. no definite shape and no definite volume

2. Identify a solid.
    a. copper
    b. oxygen
    c. water
    d. nitrogen
    e. air

3. Identify a liquid.
    a. oxygen
    b. copper
    c. salt
    d. mercury
    e. sugar

4. Draw each of the three main phases of matter such that it is clear what the differences are in (i) spacing, (ii) order and (iii) speed of particles.

5. Choose the pure substance from the list below.
    a. sea water
    b. sugar
    c. air
    d. lemonade
    e. milk

6. Choose the element from the list below.
    a. sodium chloride
    b. water
    c. carbon dioxide
    d. helium
    e. rust

7. If a solution has a temperature of 355 K, what is its temperature in degrees Celsius?

8. Determine the density of an object that has a mass of 149.8 g and displaces 12.1 mL of water when placed in a graduated cylinder.

9. The outside air temperature is 30.0°F, what is the temperature in Kelvin?

10. How many mL are in 2.54 L?

11. How many mm are in 3.20 cm?

12. A person is 64.00 inches tall. How tall is she in cm?

13. If the walls in a room are 955 square feet in area, and a gallon of paint covers 15 square yards, how many gallons of paint are needed for the room? (3 ft = 1 yd)

14. A piece of metal ore weighs 8.25 g. When a student places it into a graduated cylinder containing water, the liquid level rises from 21.25 mL to 26.47 mL. What is the density of the ore?

15. The diameter of an atom is approximately 1 × 10-10 m. What is the diameter in millimeters?

16. Because of the high heat and low humidity in the summer in Death Valley, California, a visitor requires about one quart of water for every two miles traveled on foot. Calculate the approximate number of liters required for a person to walk 10. kilometers in Death Valley.

17. The recommended adult dose of Elixophyllin, a drug used to treat asthma, is 6.00 mg/kg of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g.

18. Which of the following measurements has three significant figures?
    a. 1,207 g
    b. 4.250 g
    c. 0.006 g
    d. 0.0250 g
    e. 0.03750 g

19. A laboratory technician reports that the mass of a growth removed from a patient is 274.06 g. How many significant figures does this measurement contain?
    a. 2
    b. 3
    c. 4
    d. 5
    e. none of the above

20. Which of the following numbers contains four significant figures?
    a. 230,110
    b. 23,011.0
    c. 0.23010
    d. 0.0230100
    e. 0.002301

21. What is the total length of two pieces of tubing which measure 4.5 cm and 3.222 cm? Express the answer to the correct number of significant figures.
    a. 3.722 cm
    b. 4.722 cm
    c. 7.722 cm
    d. 7.7 cm
    e. 8 cm

22. The volume of a gas sample is recorded as 0.0970 L. How many significant figures is this?
    a. 2
    b. 3
    c. 4
    d. 5
    e. none because this is an exact number

Review of Chapter 2

1. In a chemical reaction, matter is neither created or destroyed. Which law does this refer to?
    a. Law of Definite Proportions
    b. Law of the Conservation of Mass
    c. Law of Modern Atomic Theory
    d. Law of Multiple Proportions
    e. First Law of Thermodynamics

2. Identify the description of an atom.
    a. neutrons and electrons in nucleus; protons in orbitals
    b. neutrons in nucleus; protons and electrons in orbitals
    c. protons and neutrons in nucleus; electrons in orbitals
    d. protons and electrons in nucleus; neutrons in orbitals
    e. electrons in nucleus; protons and neutrons in orbitals

3. Isotopes differ in the number of what particle?
    a. beta particles
    b. protons
    c. electrons
    d. neutrons
    e. gamma particles

4. Identify the element that has an atomic number of 40.

5. What element does "X" represent in the following symbol?

$$^{80}_{35}X$$

6. Determine the number of protons, neutrons and electrons in the following:

$$^{25}_{12}X$$

7. What element is defined by the following information? $p^+ = 17$ $n° = 20$ $e^- = 17$

8. Which of the following statements about subatomic particles is TRUE?
    a. A neutral atom contains the same number of protons and electrons.
    b. Protons have about the same mass as electrons.
    c. Electrons make up most of the mass of an atom.
    d. Protons and neutrons have opposite, but equal in magnitude, charges.
    e. Neutrons and electrons are found in the nucleus of an atom.

9. What species is represented by the following information? $p^+ = 12$, $n° = 14$, $e^- = 10$
    a. Si^{4+}
    b. Mg
    c. Ne
    d. Si
    e. Mg^{2+}

10. What ion is represented by the following information? $p^+ = 17$, $n° = 18$, $e^- = 18$

11. On the following periodic table, mark the following areas: metals, nonmetals, noble gases, alkali metals, alkaline earth metals, transition metals, inner transition metals and halogens.

The Periodic Table of the Elements

1 **H** Hydrogen 1.00794																	2 **He** Helium 4.003
3 **Li** Lithium 6.941	4 **Be** Beryllium 9.012182											5 **B** Boron 10.811	6 **C** Carbon 12.0107	7 **N** Nitrogen 14.00674	8 **O** Oxygen 15.9994	9 **F** Fluorine 18.9984032	10 **Ne** Neon 20.1797
11 **Na** Sodium 22.989770	12 **Mg** Magnesium 24.3050											13 **Al** Aluminum 26.981538	14 **Si** Silicon 28.0855	15 **P** Phosphorus 30.973761	16 **S** Sulfur 32.066	17 **Cl** Chlorine 35.4527	18 **Ar** Argon 39.948
19 **K** Potassium 39.0983	20 **Ca** Calcium 40.078	21 **Sc** Scandium 44.955910	22 **Ti** Titanium 47.867	23 **V** Vanadium 50.9415	24 **Cr** Chromium 51.9961	25 **Mn** Manganese 54.938049	26 **Fe** Iron 55.845	27 **Co** Cobalt 58.933200	28 **Ni** Nickel 58.6934	29 **Cu** Copper 63.546	30 **Zn** Zinc 65.39	31 **Ga** Gallium 69.723	32 **Ge** Germanium 72.61	33 **As** Arsenic 74.92160	34 **Se** Selenium 78.96	35 **Br** Bromine 79.904	36 **Kr** Krypton 83.80
37 **Rb** Rubidium 85.4678	38 **Sr** Strontium 87.62	39 **Y** Yttrium 88.90585	40 **Zr** Zirconium 91.224	41 **Nb** Niobium 92.90638	42 **Mo** Molybdenum 95.94	43 **Tc** Technetium (98)	44 **Ru** Ruthenium 101.07	45 **Rh** Rhodium 102.90550	46 **Pd** Palladium 106.42	47 **Ag** Silver 107.8682	48 **Cd** Cadmium 112.411	49 **In** Indium 114.818	50 **Sn** Tin 118.710	51 **Sb** Antimony 121.760	52 **Te** Tellurium 127.60	53 **I** Iodine 126.90447	54 **Xe** Xenon 131.29
55 **Cs** Cesium 132.90545	56 **Ba** Barium 137.327	57 **La** Lanthanum 138.9055	72 **Hf** Hafnium 178.49	73 **Ta** Tantalum 180.9479	74 **W** Tungsten 183.84	75 **Re** Rhenium 186.207	76 **Os** Osmium 190.23	77 **Ir** Iridium 192.217	78 **Pt** Platinum 195.078	79 **Au** Gold 196.96655	80 **Hg** Mercury 200.59	81 **Tl** Thallium 204.3833	82 **Pb** Lead 207.2	83 **Bi** Bismuth 208.98038	84 **Po** Polonium (209)	85 **At** Astatine (210)	86 **Rn** Radon (222)
87 **Fr** Francium (223)	88 **Ra** Radium (226)	89 **Ac** Actinium (227)	104 **Rf** Rutherfordium (261)	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (263)	107 **Bh** Bohrium (262)	108 **Hs** Hassium (265)	109 **Mt** Meitnerium (266)	110 (269)	111 (272)	112 (277)	113	114				

58 **Ce** Cerium 140.116	59 **Pr** Praseodymium 140.90765	60 **Nd** Neodymium 144.24	61 **Pm** Promethium (145)	62 **Sm** Samarium 150.36	63 **Eu** Europium 151.964	64 **Gd** Gadolinium 157.25	65 **Tb** Terbium 158.92534	66 **Dy** Dysprosium 162.50	67 **Ho** Holmium 164.93032	68 **Er** Erbium 167.26	69 **Tm** Thulium 168.93421	70 **Yb** Ytterbium 173.04	71 **Lu** Lutetium 174.967
90 **Th** Thorium 232.0381	91 **Pa** Protactinium 231.03588	92 **U** Uranium 238.0289	93 **Np** Neptunium (237)	94 **Pu** Plutonium (244)	95 **Am** Americium (243)	96 **Cm** Curium (247)	97 **Bk** Berkelium (247)	98 **Cf** Californium (251)	99 **Es** Einsteinium (252)	100 **Fm** Fermium (257)	101 **Md** Mendelevium (258)	102 **No** Nobelium (259)	103 **Lr** Lawrencium (262)

12. List the 7 diatomic species:

13. List the elements that exist as gases and liquids at room temperature.
    a. Gases (11 of them):

    b. Liquids (2 of them):

All of the rest exist as solids at room temperature!

14. How many molecules are in 2.50 moles of CO_2?

15. What mass (in kg) does 5.84 moles of titanium (Ti) have?

16. How many moles of Kr are contained in 398 mg of Kr?

17. How many Li atoms are contained in 97.9 g of Li?

18. Calculate the mass (in g) of 1.9×10^{24} atoms of Pb.

19. Calculate the mass (in kg) of 4.87×10^{25} atoms of Zn.

Chapter 3 Nomenclature

1. **Elements:** If the chemical symbol is given, please write the name of the element. If the name of the element is given, please write the chemical symbol.

A. Br	B. copper	C. iron	D. Hg
E. Na	F. oxygen	G. H	H. P
I. aluminum	J. Ba	K. C	L. chromium
M. fluorine	N. Li	O. Pb	P. S

2. **Ions:** If the chemical symbol/formula is given, please write the name of the ion. If the name of the ion is given, please write the chemical symbol/formula.

A. potassium ion	B. copper (I) ion	C. aluminum ion	D. ammonium ion
E. sulfide ion	F. nitrite ion	G. fluoride ion	H. phosphate ion
I. Mg^{2+}	J. P^{3-}	K. NO_3^-	L. Fe^{2+}
M. HCO_3^-	N. Ag^+	O. Be^{2+}	P. $C_2H_3O_2^-$ or CH_3COO^-

3. **Ionic Compounds**: If the chemical formula is given, please write the name of the compound. If the name of the compound is given, please write the chemical formula.

A. aluminum fluoride	B. iron(III) sulfide	C. zinc nitrate	D. barium bicarbonate
E. CuI	F. $NH_4C_2H_3O_2$	G. $Sn(SO_4)_2$	H. silver phosphide

4. **Acids**: If the chemical formula is given, please write the name of the acid. If the name of the acid is given, please write the chemical formula.

   A. nitric acid B. HCl (aq) C. sulfuric acid D. $HC_2H_3O_2(aq)$

5. **Molecular Compounds**: If the chemical formula is given, please write the name of the compound. If the name of the compound is given, please write the chemical formula.

   A. water B. NH_3 C. carbon dioxide D. hydrogen peroxide

   E. N_2O_5 F. Cl_3F_5 G. P_4O_{10} H. NO

   I. N_2O K. CCl_4 L. S_2F_{10} M. PCl_5

6. Balancing Equations: Use coefficients to balance the equations below.

   a. $CH_4\ (g) + O_2\ (g) \rightarrow CO_2\ (g) + H_2O\ (g)$

   b. $AgNO_3(aq) + K_2SO_4(aq) \rightarrow KNO_3(aq) + Ag_2SO_4(s)$

   c. $H_3PO_4\ (aq) + NaOH(aq) \rightarrow Na_2HPO_4(aq) + H_2O(l)$

   d. $C_2H_6(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$

Chapter 4: Stoichiometry and Limiting Reactant Problems

1. Ammonia is produced by the reaction

   $3\ H_2(g) + N_2(g) \rightarrow 2\ NH_3(g)$

   How many grams of ammonia can be produced from 22.7g of hydrogen with excess nitrogen present?

2. How many grams of ammonia can be formed from 36.3g of nitrogen with excess hydrogen present?

3. This is a limiting reactant problem: How many grams of ammonia can be produced from 22.7 g of hydrogen and 36.3 g of nitrogen?

4. Methyl alcohol (wood alcohol), CH_3OH, is produced via the reaction $CO(g) + 2\ H_2(g) \rightarrow CH_3OH(l)$ How many grams of methyl alcohol can be produced from 147 g of CO with excess hydrogen present?

5. How many grams of methyl alcohol can be produced from 22.1 g of hydrogen with excess CO present?

6. How many grams of methyl alcohol can be produced from 147 g of CO and 22.1 g of hydrogen?

[1] This document was checked with the Microsoft Word Accessibility Checker on 10/07/24: No accessibility issues found. People with disabilities should not have difficulty reading this document.