Name: _____

SOL REVIEW WS

Nomenclature, molar mass, products of reactions, mole conversions

Part I: Name the following compounds:

HINT: Molecular = 2 nonmetals – use prefixes
Ionic = anything else – just state the name of the cation then anion (use roman numerals if it is a cation w/ multiple charges)

1. NaCl Sodium Chloride	2. $KMnO_4$ potassium permanganate	3. Mg_3PO_4 magnesium phosphate
4. H_2O Dihydrogen monoxide	5. CO carbon monoxide	6. N_2O_4 dinitrogen tetraoxide
7. $CuSO_4$ copper (II) sulfate	8. Cu_2O copper (I) oxide	9. NH_4NO_3 ammonium nitrate
10. Al_2O_3 aluminum oxide	11. Fe_2O_3 iron (III) oxide	12. K_2O potassium oxide
13. CCl_4 carbon tetrachloride	14. SnO tin (II) oxide	15. NCl_3 nitrogen trichloride

Part II: Write formulas and calculate the molar mass.

Name	Formula	Molar Mass
16. Beryllium Nitride Be^{+2} N^{-3}	Be_3N_2	69.057 g/mol
17. Aluminum Permanganate	$Al(MnO_4)_3$	383.8 g/mol
18. Triselenium Pentabromide	Se_3Br_5	636.38 g/mol
19. Lithium Nitrite	$LiNO_2$	52.98 g/mol
20. Lithium Nitride	Li_3N	172.95 g/mol
21. Copper (II) Nitrate	$Cu(NO_3)_2$	187.57 g/mol
22. Copper(I) Sulfide	Cu_2S	159.16 g/mol
23. Carbon dioxide	CO_2	44.01 g/mol
24. Lead (IV) Phosphate	$Pb_3(PO_4)_4$	1001.48 g/mol

Part III: Balance the following reactions & determine the type of reaction (synthesis/combination, decomposition, single-replacement, double-replacement, neutralization, combustion)

25. $NaCl + AgNO_3 \rightarrow NaNO_3 + AgCl$ DR

26 $2Ca + O_2 \rightarrow 2CaO$ synthesis/combination

27. $LiCl \rightarrow Li^+ + Cl^-$ decomposition

28 $6K + Al_2S_3 \rightarrow 3K_2S + 2Al$ SR

29 $2C_{100}H_{102} + 251O_2 \rightarrow 200CO_2 + 102H_2O$ Combustion

30. $H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2HOH$ neutralization

Part IV: Answer these questions, using the balanced equation and your periodic table (for molar masses). SHOW ALL WORK

$$2Al + Fe_2O_3 \rightarrow Al_2O_3 + 2\,Fe$$

31. 20.0 grams of aluminum will react with how many grams of ferric oxide(Fe_2O_3)?

$$20.0\text{ g Al} \left|\frac{1\text{ mol Al}}{26.98\text{ g}}\right|\left|\frac{1\text{ mol } Fe_2O_3}{2\text{ mol Al}}\right|\left|\frac{159.7\text{ g}}{1\text{ mol } Fe_2O_3}\right| = 59.2\text{ g } Fe_2O_3$$

32. 10.0 moles of ferric oxide (Fe_2O_3) will produce how many moles of iron?

$$10.0\text{ mol } Fe_2O_3 \left|\frac{2\text{ mol Fe}}{1\text{ mol } Fe_2O_3}\right| = 20.0\text{ mol Fe}$$

33. 5.0 grams of ferric oxide (Fe_2O_3) and 10 grams of aluminum will produce how many grams of aluminum oxide?

$$5.0\text{ g } Fe_2O_3 \left|\frac{1\text{ mol } Fe_2O_3}{159.7\text{ g}}\right|\left|\frac{1\text{ mol } Al_2O_3}{1\text{ mol } Fe_2O_3}\right|\left|\frac{101.96\text{ g}}{1\text{ mol } Al_2O_3}\right| = 3.2\text{ g } Al_2O_3$$

$$10\text{ g Al} \left|\frac{1\text{ mol Al}}{26.98\text{ g}}\right|\left|\frac{1\text{ mol } Al_2O_3}{2\text{ mol Al}}\right|\left|\frac{101.96\text{ g}}{1\text{ mol } Al_2O_3}\right| = 18.9\text{ g } Al_2O_3$$

Part V: Use the Gas Laws to answer the following questions. SHOW ALL WORK

Charles' Law : $V_1/T_1 = V_2/T_2$

Boyle's Law : $P_1V_1 = P_2V_2$

Avogadro's Law: $V_1/n_1 = V_2/n_2$

Combined Ideal Gas Law: $\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$

Ideal Gas Law: $PV = nRT$

R= 8.31 $\frac{L*kPa}{mol*K}$; 0.0821 $\frac{L*atm}{mol*K}$; 62.4 $\frac{L*mmHg}{mol*K}$

AT STP: 1 mol = 22.4 L of gas

$P_{total} = P_1 + P_2 + P_3 \ldots$

34. What is the volume in liters of 10.0 moles of nitrogen gas at 200. Kelvin, and 4.5 atm?

$$V = \frac{nRT}{P} = \frac{(10.0\text{ mol})(.0821\ \frac{L\cdot atm}{mol\cdot K})(200.\text{ K})}{4.5\text{ atm}} = 36.\text{ L}$$

35. 10.0 liters of a gas at 700. mmHg will have what volume at 400. mmHg?

$$P_1V_1 = P_2V_2 \quad (700.\text{ mmHg})(10.0\text{ L}) = (400.\text{ mmHg})(V_2)$$

$$V_2 = 17.5\text{ L}$$

36. 20.0 liters of gas at 200. K will have what volume at 400.K?

$$\frac{V_1}{T_1} = \frac{V_2}{T_2} \quad \frac{20.0\text{ L}}{200.\text{ K}} = \frac{V_2}{400.\text{ K}} \quad V_2 = 40.0\text{ L}$$

37. At STP, how many liters will 23.93 moles of gas occupy?

$$23.93\text{ mol gas} \left|\frac{22.4\text{ L}}{1\text{ mol gas}}\right| = 536.0\text{ L}$$

38. A sealed flexible container with an initial volume of 1.0 L is occupied by a gas at a pressure of 150 kPa at 25°C. By changing the volume, the pressure of the gas increases to 600 kPa as the temperature is raised to 100°C. What is the new volume (in mL)?

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \quad \frac{(150\text{ kPa})(1.0\text{ L})}{298\text{ K}} = \frac{(600\text{ kPa})(V_2)}{373\text{ K}}$$

$$V_2 = .313\text{ L} = 313\text{ mL}$$

39. Determine the total pressure of a gas mixture that contains oxygen, nitrogen, and helium if the partial pressures of the gases are P_{O2} = 20.0 kPa, P_{N2} = 46.7 kPa, and P_{He} = *26.7* kPa.

$$P_T = P_{O_2} + P_{N_2} + P_{He} = 20.0\text{ kPa} + 46.7\text{ kPa} + 26.7\text{ kPa}$$

$$P_T = 93.4\text{ kPa}$$

Part VI: Fill in the table for the following subatomic particles.

Symbol	Name	Charge	Mass	Location within the atom
e-	electron	-1	0	orbitals
p^+	proton	+1	1	nucleus
n^0	neutron	0	1	nucleus