CHE 111 - Homework - Ch 7f

OER 6.1, 6.3 and 7.3 **Chemical Conversions** Score: _____/80

Name: _____ Date: _____

[5 pt] 1. Calculate the molecular weights in (g/mol) for the following compounds. Show work to receive credit.

(a) $Mg_3(PO_4)_2$ 1(a) _____

(b) $HC_2H_3O_2$ 1(b) _____

[15 pt] 2. Perform the following conversions. Use correct units and significant figures in all calculations.

(a) 20.0 mols KNO_3 to grams 2(a) _____

(b) 5.4×10^3 g of $(NH_4)_2C_2O_4$ to mols 2(b) _____

(c) 5.0×10^{21} atoms of He to grams 2(c) _____

(d) 50.0 millimol NaOH to molecules 2(d) _____

(e) 72.000 millimol HCl to grams 2(e) _____

[15 pt] 3. Perform the following conversions. Use correct units and significant figures in all calculations.

(a) 152 kg $CaCO_3$ to molecules 3(a) _____

(b) How many oxygen atoms are in 1.75 moles of H_3PO_4? 3(b) _____

(c) How many atoms of oxygen of $NaNO_3$ are in 4.5 grams of $NaNO_3$? 3(c) _____

(d) What is the molarity of a solution made from 125.5 grams of KNO_3 in 500.0 mL of water? 3(d) _____

(e) How many mols of HCl are in a 150.0 mL of a 2.0 M solution? 3(e) _____

(f) How many grams of boric acid (H_3BO_4) would I need to prepare a 167 mL of a 0.200 M solution? 3(f) _____

[15 pt] 4. Answer the following questions about the reaction below:

$$\_\_H_3PO_4(aq) + \_\_KOH(aq) \longrightarrow \_\_K_3PO_4(aq) + \_\_H_2O(l) + 250kJ$$

(a) How many moles of H_3PO_4 are required to react with 15.0 mols of KOH? 4(a) _____

(b) How many moles of H_3PO_4 are required to produce 12.0 moles of K_3PO_4? 4(b) _____

(c) How many moles of KOH are required to produce 8.50 moles of K_3PO_4? 4(c) _____

(d) How many moles of H_2O are produced when 2.5×10^{-1} mols of H_3PO_4 react? 4(d) _____

(e) How many moles of KOH are required to produce 2.5×10^8 J of heat? 4(e) _____

(f) Challenge Question: If you want to make 10 moles of H_2O how many moles of H_3PO_4 and how many moles of KOH will you need? 4(f) _____

. 4(f) _____

(g) Challenge Question: If you have 6 mols of H_3PO_4 and 6 moles of KOH how many moles of K_3PO_4 can you produce? 4(g) _____

[15 pt] 5. Octane, C_8H_{18}, burns in air to form carbon dioxide and water according to the following reaction.

$$2C_8H_{18}(l) + 25O_2(g) \longrightarrow 16CO_2(g) + 18H_2O(g) + 10{,}900 \text{ kJ}$$

(a) How many grams of CO_2 are produced when 10.0 grams of C_8H_{18} are combusted? 5(a) _____

(b) How many grams of O_2 gas are consumed to produce 530.0 grams of H_2O? 5(b) _____

(c) How many grams of C_8H_{18} must be combusted to produce 25.0 kg of CO_2? 5(c) _____

(d) How many kJ of energy is created when 100.0 grams of C_8H_{18} are combusted? 5(d) _____

(e) How many grams of products can be produced from burning 53.75 grams of C_8H_{18}? 5(e) _____

. 5(e) _____

[15 pt] 6. In a blast furnace, iron (III) oxide reacts with coke (carbon) to produce molten iron and carbon monoxide.

(a) Write the balanced reaction described above. Be sure to include the states of known materials.

(b) How many grams of carbon are required to react with 15.0 grams of iron (III) oxide? 6(b) _____

(c) How many grams of Iron (III) oxide are required to produce 10.0 kg of Iron? 6(c) _____

(d) How many kilograms of carbon monoxide are produced for every 1.0 kilograms of of Iron produced? 6(d) _____

(e) How many grams of Iron can be produced from 1.0 kg of Iron (III) Oxide? 6(e) _____