Name: _____

Homework was checked against the key with wrong answers corrected.

Parent Signature: _____

Chapter 9.3: Stoichiometry

Each numbered question is worth 1 point except as noted. Total possible = 18 points

Section 9.3

23. The equation for the complete combustion of ethene (C_2H_4) is:

$C_2H_4(g) + 3\ O_2(g) \rightarrow 2\ CO_2(g) + 2\ H_2O(g)$

If 2.70 mol C_2H_4 is reacted with 6.30 mol O_2,

a. Identify the limiting reagent.

b. Calculate the moles of water produced.

24. The equation for the incomplete combustion of ethene (C_2H_4) is:

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If 2.70 mol C_2H_4 is reacted with 6.30 mol O_2,

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25. Hydrogen gas can be produced in the laboratory by the reaction of magnesium metal with hydrochloric acid.

$Mg(s) + 2\ HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$

a. Identify the limiting reagent when 6.00 g HCl reacts with 5.00 g Mg.

b. How many grams of hydrogen can be produced when 6.00 g HCl is added to 5.00 g Mg?

26. Acetylene (C_2H_2) will burn in the presence of oxygen:

$$2\ C_2H_2(g) + 5\ O_2(g) \rightarrow 4\ CO_2(g) + 2\ H_2O(g)$$

How many grams of water can be produced by the reaction of 2.40 mol C_2H_2 with 7.4 mol O_2?

27. When 84.8 g of iron(III) oxide reacts with an excess of carbon monoxide, 54.3 g of iron is produced according to the reaction:

$$Fe_2O_3(s) + 3\ CO(g) \rightarrow 2\ Fe(s) + 3\ CO_2(g)$$

What is the percent yield of this reaction?

28. If 50.0 g of silicon dioxide is heated with an excess of carbon, 27.9 g of silicon carbide is produced.

$$SiO_2(s) + 3\ C(s) \rightarrow SiC(s) + 2\ CO(g)$$

What is the percent yield of this reaction?

29. What is a limiting reagent? An excess reagent? (0.5 pts)

30. What is the percent yield if 4.65 g of copper is produced when 1.87 g of aluminum reacts with an excess of copper(II) sulfate?

$2\ Al(s) + 3\ CuSO_4(aq) \rightarrow Al_2(SO_4)_3(aq) + 3\ Cu(s)$

31. What is the difference between an actual yield and a theoretical yield? Which yield is larger for a given reaction? How are these values used to determine percent yield?

32. How many grams of SO_3 are produced when 20.0 g FeS_2 reacts with 16.0 g O_2 according to:

$4\ FeS_2(s) + 15\ O_2(g) \rightarrow 2\ Fe_2O_3(s) + 8\ SO_3(g)$

Chapter 9 Review

38. Methanol (CH_3OH) is used in the production of many chemicals. Methanol is made by reacting carbon monoxide and hydrogen at a high temperature and pressure. 9.2 (1.5 pts)

$CO(g) + 2\ H_2(g) \rightarrow CH_3OH(g)$

a. How many moles of each reactant are needed to produce 3.60×10^2 g CH_3OH?

b. Calculate the number of grams of each reactant needed to produce 4.00 mol CH_3OH.

c. How many grams of hydrogen are necessary to react with 2.85 mol CO?

Answer questions #44-46 for reactions a-d which follow. 9.3 (1.5 points each for a-d)
44. Identify by *circling* the limiting reagent for the given combination of reactants.
45. Calculate the number of moles of product formed.
46. Calculate the number of moles of excess reagent remaining after the reaction.

				# moles formed	# moles excess
a.	2 Al +	3 Cl_2 →	2 $AlCl_3$		
	3.6 mol	5.3 mol		_____	_____
b.	2 H_2 +	O_2 →	2 H_2O		
	6.4 mol	3.4 mol		_____	_____
c.	2 P_2O_5 +	6 H_2O →	4 H_3PO_4		
	0.48 mol	1.52 mol		_____	_____
d.	4 P +	5 O_2 →	2 P_2O_5		
	14.5 mol	18.0 mol		_____	_____

55. If the reaction below proceeds with a 96.8 % yield, how many kilograms of $CaSO_4$ are formed when 5.24 kg SO_2 reacts with an excess of $CaCO_3$ and O_2?

$2\ CaCO_3(s) + 2\ SO_2(g) + O_2(g) \rightarrow 2\ CaSO_4(s) + 2\ CO_2(g)$?