Name KEY Date ____/____/____ Period 1st

Quiz 8.3 Limiting and Excess Reagents

SHOW ALL WORK. Use dimensional analysis, show all units being cancelled and solve answer with correct units. DO NOT WORRY ABOUT SIGNIFICANT FIGURES.

(a) Calculate the **theoretical yield** of GRAMS of product formed from each given reactant. F

(b) Determine the **limiting reagent and excess reagent**

(c) Calculate the GRAMS of **excess reagent** remaining

1. $2\ H_2 + O_2 \rightarrow 2\ H_2O$ 10.0 mol H_2 & 10.0 g O_2

1a. $10.\ mol\ H_2 \left| \frac{2\ mol\ H_2O}{2\ mol\ H_2} \right| \frac{18\ g\ H_2O}{1\ mol\ H_2O} = 180.\ g\ H_2O$

$10.0\ g\ O_2 \left| \frac{1\ mol\ O_2}{32\ g\ O_2} \right| \frac{2\ mol\ H_2O}{1\ mol\ O_2} \left| \frac{18\ g\ H_2O}{1\ mol\ H_2O} \right| = 11.25\ g\ H_2O$

1b. Limiting Reagent: $10.0\ g\ O_2$ Excess Reagent: $10.0\ mol\ H_2$

1c. $10.0\ mol\ H_2 \left| \frac{2\ g\ H_2}{1\ mol\ H_2} \right| = 20.0\ g$ AVAILABLE

$10.0\ g\ O_2 \left| \frac{1\ mol\ O_2}{32\ g\ O_2} \right| \frac{2\ mol\ H_2}{1\ mol\ O_2} \left| \frac{2\ g\ H_2}{1\ mol\ H_2} \right| = 1.25\ g\ H_2$ USED

$20.0\ g\ H_2 - 1.25\ g\ H_2 = 18.75\ g$ LEFT OVER

2. $4\ P + 5\ O_2 \rightarrow 2\ P_2O_5$ 100. g P & 100. g O_2

2a. $100.\ g\ P \left| \frac{1\ mol\ P}{31\ g\ P} \right| \frac{2\ mol\ P_2O_5}{4\ mol\ P} \left| \frac{142\ g\ P_2O_5}{1\ mol\ P_2O_5} \right| = 229.0\ g\ P_2O_5$

$100.\ g\ O_2 \left| \frac{1\ mol\ O_2}{32\ g\ O_2} \right| \frac{2\ mol\ P_2O_5}{5\ mol\ O_2} \left| \frac{142\ g\ P_2O_5}{1\ mol\ P_2O_5} \right| = 177.5\ g\ P_2$

2b. Limiting Reagent: $100.\ g\ O_2$ Excess Reagent: $100.\ g\ P$

2c. 100. g P AVAILABLE

$100.\ g\ O_2 \left| \frac{1\ mol\ O_2}{32\ g\ O_2} \right| \frac{4\ mol\ P}{5\ mol\ O_2} \left| \frac{31\ g\ P}{1\ mol\ P} \right| = 77.5\ g\ P$ USED

$100 - 77.5 = 22.5\ g\ P$ LEFT OVER

Name KEY Date ____/____/____ Period 1st

Quiz 8.3 Limiting and Excess Reagents

SHOW ALL WORK. Use dimensional analysis, show all units being cancelled and solve answer with correct units. DO NOT WORRY ABOUT SIGNIFICANT FIGURES. B

(a) Calculate the **theoretical yield** of GRAMS of product formed from each given reactant.
(b) Determine the **limiting reagent and excess reagent**
(c) Calculate the GRAMS of **excess reagent** remaining

1. $2\ H_2 + O_2 \rightarrow 2\ H_2O$ 10.0 mol H_2 & 10.0 g O_2

1a. $10.0\ mol\ H_2 \left| \frac{2\ mol\ H_2O}{2\ mol\ H_2} \right| \frac{18\ g\ H_2O}{1\ mol\ H_2O} = 180.\ g\ H_2O$

$10.0\ g\ O_2 \left| \frac{1\ mol\ O_2}{32\ g\ O_2} \right| \frac{2\ mol\ H_2O}{1\ mol\ O_2} \left| \frac{18\ g\ H_2O}{1\ mol\ H_2O} \right| = 11.25\ g\ H_2O$

1b. Limiting Reagent: 10.0 g O_2 Excess Reagent: 10.0 mol H_2

1c. $10.0\ mol\ H_2 \left| \frac{2\ g\ H_2}{1\ mol\ H_2} \right| = 20.0\ g\ H_2$ AVAILABLE

$10.0\ g\ O_2 \left| \frac{1\ mol\ O_2}{32\ g\ O_2} \right| \frac{2\ mol\ H_2}{1\ mol\ O_2} \left| \frac{2\ g\ H_2}{1\ mol\ H_2} \right| = 1.25\ g\ H_2$ USED

$20.0\ g\ H_2 - 1.25\ g\ H_2 = 18.75\ g$ LEFT OVER

2. $N_2 + 3\ H_2 \rightarrow 2\ NH_3$ 10.0 mol N_2 and 10.0 g H_2

2a. $10.0\ mol\ N_2 \left| \frac{2\ mol\ NH_3}{1\ mol\ N_2} \right| \frac{17\ g\ NH_3}{1\ mol\ NH_3} = 340\ g\ NH_3$

$10.0\ g\ H_2 \left| \frac{1\ mol\ H_2}{2\ g\ H_2} \right| \frac{2\ mol\ NH_3}{3\ mol\ H_2} \left| \frac{17\ g\ NH_3}{1\ mol\ NH_3} \right| = 56.7\ g$

2b. Limiting Reagent: 10.0 g H_2 Excess Reagent: 10.0 mol N_2

2c. $10.0\ mol\ N_2 \left| \frac{28\ g\ N_2}{1\ mol\ N_2} \right| = 280\ g\ N_2$ AVAILABLE

$10.0\ g\ H_2 \left| \frac{1\ mol\ H_2}{2\ g\ H_2} \right| \frac{1\ mol\ N_2}{3\ mol\ H_2} \left| \frac{28\ g\ N_2}{1\ mol\ N_2} \right| = 46.7\ g\ N_2$ USED

$280 - 46.7 = 233.3\ g\ N_2$ LEFTOVER