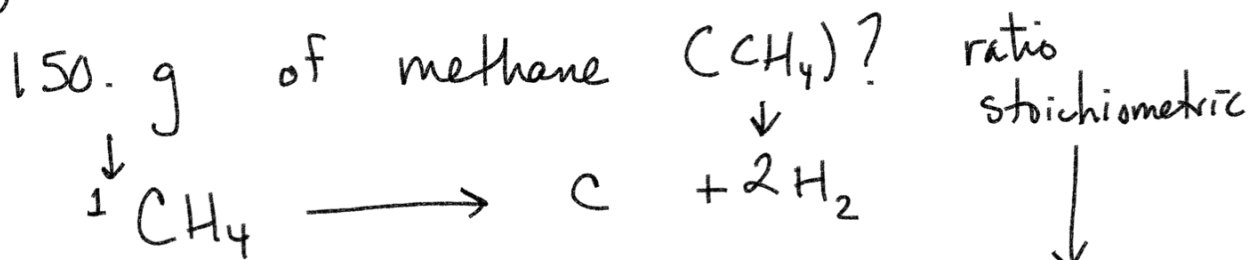


TH-GC General Chemistry Week 17 1/26

Methane breaks down into carbon and hydrogen gas.

How many grams of hydrogen is produced by the complete decomposition of



150g CH₄

molar mass of CH₄

$$1 \text{ C} = 1 * 12.011 \text{ g/mol} = 12.011$$

$$4 \text{ H} = 4 * 1.008 \text{ g/mol} = 4.032$$

$$\hline 16.043 \text{ g/mol}$$

molar mass of H₂

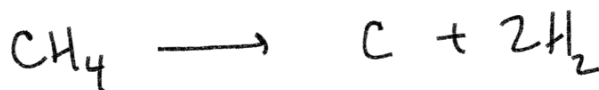
$$2 \text{ H} = 2 * 1.008 = 2.016 \text{ g/mol}$$

$$150. \text{ g CH}_4 * \frac{1 \text{ mol CH}_4}{16.043 \text{ g CH}_4} * \frac{2 \text{ mol H}_2}{1 \text{ mol CH}_4} * \frac{2.016 \text{ g H}_2}{1 \text{ mol H}_2}$$

↑
molar mass CH₄

37.6 g H₂

How many atoms of carbon? 150g CH₄



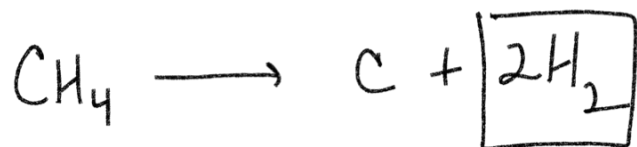
$$150. \text{ g CH}_4 * \frac{1 \text{ mol CH}_4}{16.043 \text{ g CH}_4} * \frac{1 \text{ mol C}}{1 \text{ mol CH}_4} * \frac{6.022 * 10^{23} \text{ atoms}}{1 \text{ mol C}}$$

$$56.3 * 10^{23} \text{ atoms}$$

$$\hline 5.63 * 10^{24} \text{ atoms}$$

How many liters of H_2 gas is produced

molar volume $\rightarrow 22.4 \text{ L/mol}$



150 g CH_4

$$150 \text{ g } CH_4 * \frac{1 \text{ mol } CH_4}{16.043 \text{ g } CH_4} * \frac{2 \text{ mol } H_2}{1 \text{ mol } CH_4} * \frac{22.4 \text{ L}}{1 \text{ mol } H_2}$$

amount ratio question

$\boxed{419 \text{ L } H_2}$

86 g of $\boxed{Al_2O_3}$ decomposed into how many grams of \boxed{Al} ?



$$86 \text{ g } \boxed{Al_2O_3} * \frac{1 \text{ mol } Al_2O_3}{101.961 \text{ g } Al_2O_3} * \frac{4 \text{ mol } Al}{2 \text{ mol } Al_2O_3} * \frac{26.982 \text{ g } Al}{1 \text{ mol } Al}$$

$$Al: 2 * 26.982 = 53.964$$

$$O: 3 * 15.999 = \frac{47.997}{101.961}$$

↑
amount
 Al_2O_3

↑
molar
ratio

$\boxed{45.5 \text{ g } Al}$

