

- Write the balanced equation for the combustion of isooctane (C₈H₁₈) to produce water vapor and carbon dioxide gas. Assuming the gasoline is 98.% isooctane, with a density of 0.692 g/mL, what is the mass of carbon dioxide produced by the combustion of 1.20 × 10¹⁰ gal of gasoline, the approximate annual consumption of gasoline in the US.?

- White phosphorous, P₄, is prepared by fusing calcium phosphate with carbon and sand, silicon dioxide in an electric furnace.



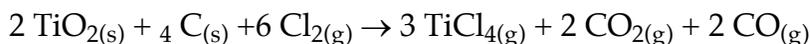
How many grams of calcium phosphate are required to give 5.00 g of phosphorus?

- Solutions of sodium hypochlorite are sold as bleach. They are prepared by the reaction of chlorine gas with sodium hydroxide.



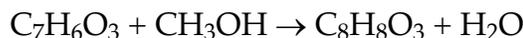
If chlorine gas is bubbled into a solution containing 54.2 g of NaOH, how many grams of chlorine will eventually react?

- When dinitrogen pentoxide is heated, it decomposes to nitrogen dioxide and oxygen gas. If a sample of dinitrogen pentoxide produces 1.618 g of oxygen gas, how many grams of nitrogen dioxide are formed? (you need to write a balanced equation)
- Titanium, which is used to make airplane engines and frames, can be obtained from titanium tetrachloride.



A vessel contains 4.15 g of TiO₂, 5.67 g of C and 6.78 g of Cl₂. Suppose the reaction goes to completion as written. How many grams of TiCl₄ can be produced? How much excess remains?

In a reaction 1.50 g of salicylic acid is reacted with 11.20 g of methanol. The yield of methyl salicylate, C₈H₈O₃ is 1.31 g. What is the percentage yield?



- A compound contains only carbon, hydrogen and oxygen. Combustion of 10.68 mg of the compound yields 16.01 mg of CO₂ and 4.37 mg of H₂O. The molar mass of the compound is 176.1g/mol. What are the empirical and molecular formulas of the compounds?
- Methanol is used as fuel in race cars. It is manufactured by reacting hydrogen gas with carbon monoxide. This reaction gives a 52.0% yield. How much hydrogen is needed to react with excess carbon monoxide if you need 3.00 kg of methanol?

