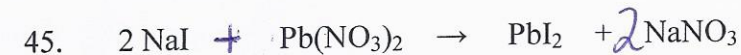
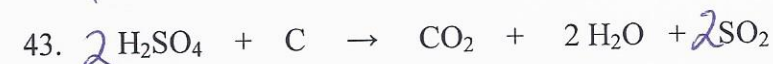
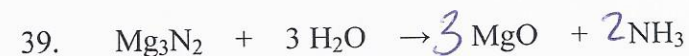
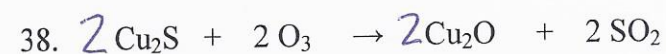
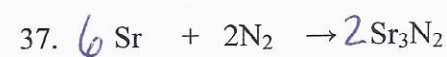
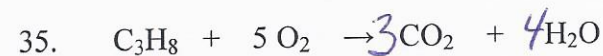
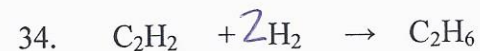
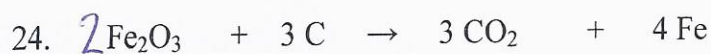


## Balance the equations

- $2 \text{SO}_2 + \text{O}_2 \rightarrow 2 \text{SO}_3$
- $4 \text{Fe} + 3 \text{O}_2 \rightarrow 2 \text{Fe}_2\text{O}_3$
- $\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$
- $\text{TiCl}_4 + \text{O}_2 \rightarrow \text{TiO}_2 + 2 \text{Cl}_2$
- $\text{Ba}(\text{OH})_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2 \text{NaOH}$
- $4 \text{Al} + 3 \text{O}_2 \rightarrow 2 \text{Al}_2\text{O}_3$
- $\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2 \rightarrow 6 \text{CO}_2 + 6 \text{H}_2\text{O}$
- $\text{Pb}(\text{NO}_3)_2 + 2 \text{KI} \rightarrow \text{PbI}_2 + 2 \text{KNO}_3$
- $\text{Cl}_2 + 2 \text{Na} \rightarrow 2 \text{NaCl}$
- $4 \text{NaOH} \rightarrow 4 \text{Na} + \text{O}_2 + 2 \text{H}_2\text{O}$
- $2 \text{NH}_3 + 3 \text{Cl}_2 \rightarrow 6 \text{HCl} + \text{N}_2$
- $2 \text{N}_2 + 5 \text{O}_2 \rightarrow 2 \text{N}_2\text{O}_5$
- $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$
- $4 \text{P} + 5 \text{O}_2 \rightarrow 2 \text{P}_2\text{O}_5$
- $2 \text{P} + 3 \text{Cl}_2 \rightarrow 2 \text{PCl}_3$
- $4 \text{FeS} + 7 \text{O}_2 \rightarrow 2 \text{Fe}_2\text{O}_3 + 4 \text{SO}_2$
- $2 \text{KNO}_3 \rightarrow 2 \text{KNO}_2 + \text{O}_2$
- $2 \text{H}_2\text{O}_2 \rightarrow 2 \text{H}_2\text{O} + \text{O}_2$
- $\text{CO}_2 + 2 \text{KOH} \rightarrow \text{K}_2\text{CO}_3 + \text{H}_2\text{O}$
- $2 \text{Al} + 3 \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 3 \text{H}_2$
- $\text{NH}_4\text{NO}_2 \rightarrow \text{N}_2 + 2 \text{H}_2\text{O}$
- $2 \text{HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$



46. Choose the balanced equation

- A)  $2 \text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{H}_3\text{O} + \text{K}_2\text{SO}_4$
- B)  $\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{O} + \text{K}_2\text{SO}_4$
- C)  $\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{OHSO}_5 + \text{KH}_2$
- D)  $2 \text{KOH} + \text{H}_2\text{SO}_4 \rightarrow 2 \text{H}_2\text{O} + \text{K}_2\text{SO}_4$

47. Choose the balanced equation

- A)  $2 \text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- B)  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + 2 \text{H}_2\text{O}$
- C)  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- D)  $\text{HCl} + 2 \text{NaOH} \rightarrow 2 \text{NaCl} + 2 \text{H}_2\text{O}$

48. Which equation is **not** balanced?

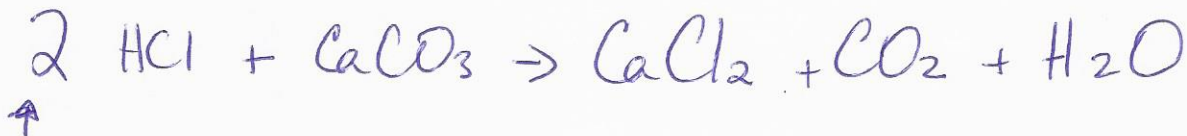
- A)  $2 \text{NO} + \text{O}_2 \rightarrow 2 \text{NO}_2$
- B)  $2 \text{Na} + 2 \text{H}_2\text{O} \rightarrow 2 \text{NaOH} + \text{H}_2$
- C)  $\text{H}_3\text{PO}_4 + 3 \text{KOH} \rightarrow \text{K}_3\text{PO}_4 + 3 \text{H}_2\text{O}$
- D)  $3 \text{HBr} + \text{Fe}(\text{OH})_3 \rightarrow \text{FeBr}_3 + 6 \text{H}_2\text{O}$

49. Which **equations** are balanced?

- A)  $\text{CH}_4 + 3 \text{O}_2 \rightarrow \text{CO}_2 + 2 \text{H}_2\text{O}$
- B)  $4 \text{C}_2\text{H}_5 + 13 \text{O}_2 \rightarrow 8 \text{CO}_2 + 10 \text{H}_2\text{O}$
- C)  $\text{C}_3\text{H}_8 + 2 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$
- D)  $\text{C}_4\text{H}_8 + 6 \text{O}_2 \rightarrow 4 \text{CO}_2 + 4 \text{H}_2\text{O}$

50. The neutralization of hydrochloric acid (HCl) by calcium carbonate ( $\text{CaCO}_3$ ) produces calcium chloride ( $\text{CaCl}_2$ ), carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ).

**Write the balanced equation for this neutralization reaction.**



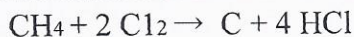
51. The combustion of methane,  $\text{CH}_4$  mixed with  $\text{O}_2$  produces carbon dioxide,  $\text{CO}_2$ , and water,  $\text{H}_2\text{O}$ . The unbalanced chemical equation for this reaction is as follows:



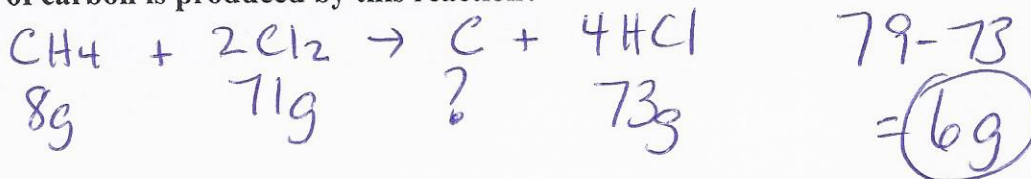
**Balance the chemical equation for this combustion reaction.**



52. The complete reaction of 8 g of methane (CH<sub>4</sub>) with 71 g of chlorine gas (Cl<sub>2</sub>) produces 73 g of hydrochloric acid (HCl) and a certain amount of carbon (C).  
The balanced equation for this reaction is as follows:



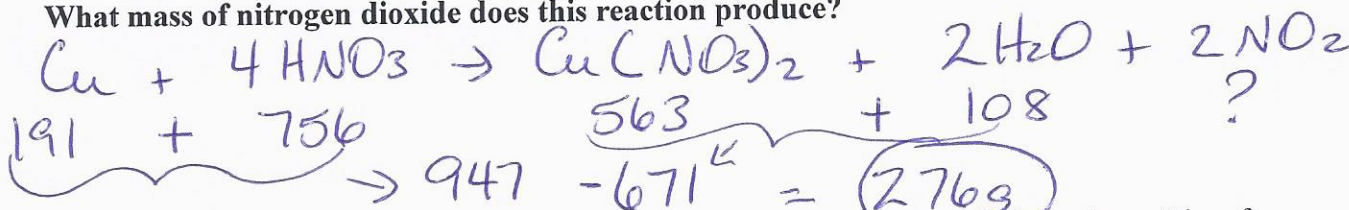
What mass of carbon is produced by this reaction?



53. When 191 g of copper, Cu, is combined with 756 g of nitric acid, HNO<sub>3</sub>, the chemical reaction produces 563 g of copper nitrate, Cu(NO<sub>3</sub>)<sub>2</sub>, 108 g of water, H<sub>2</sub>O, and a certain amount of nitrogen dioxide, NO<sub>2</sub>. This reaction is represented by the following balanced chemical equation:



What mass of nitrogen dioxide does this reaction produce?



54. The combustion of 16 g of methane (CH<sub>4</sub>) in 64 g of oxygen gas (O<sub>2</sub>) produces 36 g of water (H<sub>2</sub>O) and a certain mass of carbon dioxide (CO<sub>2</sub>). The following balanced equation represents this combustion reaction:

Combustion Reaction Involving Methane



$$80 - 36 = \textcircled{44\text{g}}$$

The combustion of 11 g of propane (C<sub>3</sub>H<sub>8</sub>) in 40 g of oxygen gas (O<sub>2</sub>) produces 18 g of water (H<sub>2</sub>O) and a certain mass of carbon dioxide (CO<sub>2</sub>). The following balanced equation represents this combustion reaction:

Combustion Reaction Involving Propane



$$51 - 18 = \textcircled{33\text{g}}$$

Which of these two reactions produces the smaller mass of carbon dioxide (CO<sub>2</sub>)?  
For each reaction, show the calculations required to determine the mass of carbon dioxide (CO<sub>2</sub>) produced.

2nd produces smaller CO<sub>2</sub>