Year 10 Science: Combination reactions and combustion

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Write a balanced equation for calcium combining with oxygen, and say whether the product is ionic or covalent.

2. Balance the complete combustion of ethane: $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$

3. A camping stove has a yellow, sooty flame. Name two products besides water and explain the cause.

4. Gas from a burning candle is bubbled through limewater, which turns milky. What does this show?

5. Why is burning magnesium classed as both combustion and combination?

Fix the mistake

6. Correct this statement: "Methane burns to make carbon dioxide and hydrogen."

7. Correct this statement: "Incomplete combustion makes carbon monoxide instead of water."

8. Correct this statement: "Burning magnesium gives off carbon dioxide and water like any fuel."

9. Correct this statement: "Balancing propane, I wrote $C_3H_8 + 5O \rightarrow 3CO_2 + 4H_2O$."

Answer key (for parents and tutors)

1. Write a balanced equation for calcium combining with oxygen, and say whether the product is ionic or covalent.
   $2Ca + O_2 \rightarrow 2CaO$; ionic, because calcium is a metal and oxygen a non-metal.
2. Balance the complete combustion of ethane: $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$
   $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$: 4 C, 12 H and 14 O on each side (doubling avoids a half O_2).
3. A camping stove has a yellow, sooty flame. Name two products besides water and explain the cause.
   Any two of soot (carbon), CO and CO_2; the burner is short of oxygen, so combustion is incomplete.
4. Gas from a burning candle is bubbled through limewater, which turns milky. What does this show?
   Carbon dioxide is a product, so the candle wax contains carbon.
5. Why is burning magnesium classed as both combustion and combination?
   It reacts with oxygen and releases heat and light (combustion), and two reactants form one product, magnesium oxide (combination).
6. Correct this statement: "Methane burns to make carbon dioxide and hydrogen."
   The hydrogen atoms combine with oxygen, so burning methane fully gives carbon dioxide and water.
7. Correct this statement: "Incomplete combustion makes carbon monoxide instead of water."
   Water still forms, because the hydrogen burns easily; only the carbon ends up as soot and carbon monoxide as well as some carbon dioxide.
8. Correct this statement: "Burning magnesium gives off carbon dioxide and water like any fuel."
   Magnesium contains no carbon or hydrogen, so the only product is magnesium oxide.
9. Correct this statement: "Balancing propane, I wrote $C_3H_8 + 5O \rightarrow 3CO_2 + 4H_2O$."
   Oxygen gas is always O_2, so the oxygen count of 10 atoms means $5O_2$.