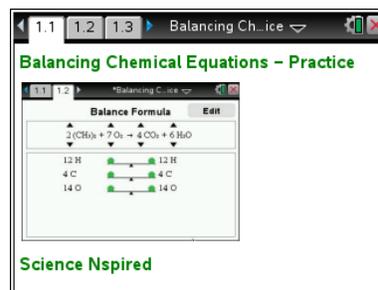




Open the TI-Nspire™ document

Balancing_Chemical_Equations_Practice.tns.

In this activity you will use ChemBox feature of TI-Nspire™ technology to practice balancing chemical equations.



Move to pages 1.2 – 1.4.

Answer questions 1–3 here and/or in the .tns file.

Press **ctrl** and **ctrl** to navigate through the lesson.

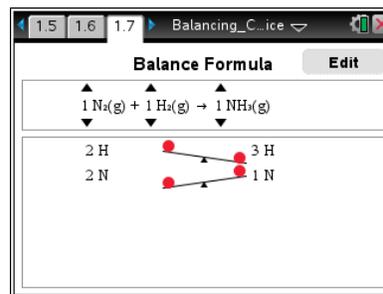
Q1. Identify the reactants and products of the reaction $\text{N}_2(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{NH}_3(\text{g})$.

Q2. Explain the meaning of subscripts in the equation.

Q3. Explain whether this equation is balanced or not.

Move to pages 1.5 – 1.7.

1. Click **Balance** to balance the equation. Use the up and down arrows to adjust the coefficients that appear in front of each reactant or product.



Page 1.7 lets you enter and balance chemical equations. Press **Edit** to enter or edit the chemical equation. Press **Balance** to balance the chemical equation. Click **Edit** or **Balance** or press **enter** to toggle between the two modes.

Edit mode:

- Enter the reactants in the box on the left and enter the products in the box on the right.
- Enter a plus sign (+) to separate the elements.
- Use the **tab** key to move between the left and right hand side of the chemical equation. You cannot adjust the \rightarrow sign.

**Balance** mode:

- Click the up or down arrows to adjust the coefficients of each element until the formula is balanced.

Built-in rules:

- Leading digits are treated as a multiplier for the molecule and are displayed in regular-sized characters.
- An integer immediately following a letter or closing parenthesis is converted to subscript. This is the number of atoms or group of atoms in a molecule.
- Entering (s), (l), (g), or (aq) after the compound indicates its state: solid, liquid, gas, aqueous.

Move to pages 1.8 – 1.10.

Answer questions 4–6 here and/or in the .tns file.

Q4. How many atoms of each element are present on each side of an equation?

Q5. Explain the meaning of coefficients in the equation.

Q6. Classify the reaction using the following categories. It may fall into more than one category.

- Synthesis –two or more substances react to form a single new substance
- Decomposition – a single compound breaks down into two or more simpler products
- Single replacement – one element replaces a second element in a compound
- Double replacement – an exchange of positive ions between two compounds
- Combustion – an element or a compound that reacts with oxygen



2. For each equation given on pages 2.2 – 2.9, use the Chemical Balance tool to balance the equation and record it in the table. Record the number of atoms of *each* element in the reactant (left side) and the products (right side). Classify each reaction as a synthesis, decomposition, single replacement, double replacement, acid-base reaction, or combustion. Some reactions may fall into more than one category.

Equation Write the balanced equation below the given one.	Number of atoms		Type
	Reactants	Products	
$P_4 + O_2 \rightarrow P_2O_3$			
$BaS + PtF_2 \rightarrow BaF_2 + PtS$			
$CH_4 + O_2 \rightarrow CO_2 + H_2O$			
$Na_3PO_4 + CaCl_2 \rightarrow NaCl + Ca_3(PO_4)_2$			
$NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$			
$HNO_3 + Ba(OH)_2 \rightarrow Ba(NO_3)_2 + H_2O$			
$Na_3N \rightarrow Na + N_2$			
$Al + HCl \rightarrow AlCl_3 + H_2$			



3. For each word equation given on page 2.10, use the Chemical Balance tool on page 2.11 to balance the equation and record it in the table. First, write the balanced equation using the element symbols. Record the number of atoms of *each* element in the reactant (left side) and the products (right side). Classify each reaction as a synthesis, decomposition, single replacement, double replacement, acid-base reaction, or combustion. Some reactions may fall into more than one category.

Equation Write the balanced equation below the given one.	Number of atoms		Type
	Reactants	Products	
Copper (s) + silver nitrate (aq) → silver (s) + copper (II) nitrate (aq)			
Hydroiodic acid (aq) + sodium hydroxide (aq) → sodium iodide (aq) + water (l)			
Calcium hydroxide (s) → calcium oxide (s) + water (v)			
Cesium (s) + bromine (l) → cesium bromide (s)			
Sulfuric Acid (aq) + potassium hydroxide (aq) → potassium sulfate (aq) + water (l)			
Hydrogen (g) + chlorine (g) → hydrogen chloride (g)			
Magnesium chlorate (s) → magnesium chloride (s) + oxygen (g)			
Benzene (C ₆ H ₆) (l) + oxygen (g) → carbon dioxide (g) + water (v)			



Move to pages 3.1 – 3.7.

Answer questions 7–13 here and/or in the .tns file.

Q7. Identify the reactants in the chemical equation $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$.

- A. CH_4
- B. O_2
- C. CO_2
- D. H_2O

Q8. Select all statements that are true.

- A. The type and number of atoms must be the same on both sides of the equation.
- B. The number of moles must be the same on both sides of the equation.
- C. The mass of the reactants and the mass of the products are the same.
- D. An equation is balanced by writing whole numbers before a chemical symbol or formula.
- E. An equation is balanced by changing subscripts in chemical formulas.

Q9. Select all equations that are NOT balanced.

- A. $2\text{NaBr} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{Br}_2$
- B. $\text{C}_2\text{H}_6 + 5\text{O}_2 \rightarrow 6\text{H}_2\text{O} + 2\text{CO}_2$
- C. $3\text{CaCl}_2 + 2\text{Na}_3\text{PO}_4 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{NaCl}$
- D. $2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$

Q10. Balance the equation $\text{Fe} + \text{H}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + \text{H}_2$.

Q11. Write a balanced equation for the chemical reaction below.

Potassium (s) + water (l) \rightarrow potassium hydroxide (aq) + hydrogen (g)

Q12. The chemical reaction $2\text{C}_6\text{H}_6 + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$ can be classified as:

- A. synthesis
- B. double replacement
- C. combustion
- D. neutralization

Q13. The chemical reaction $\text{HNO}_3 + \text{LiOH} \rightarrow \text{LiNO}_3 + \text{H}_2\text{O}$ can be classified as:

- A. decomposition
- B. combustion
- C. synthesis
- D. neutralization