

Reaction Atom Inventory

Use symbols, coefficients, and subscripts to identify elements and count atoms

Name: _____ Date: _____

Part 1 - Read the Formula

Directions: Use the element reference below. In a formula, a **coefficient** multiplies every atom in the formula unit. A **subscript** tells atoms of the symbol just before it. An **atomic number** identifies an element; it is not an atom count. A superscript **charge** tells electrical charge; it is not an atom count.

Element	Symbol	Atomic number
Hydrogen	H	1
Carbon	C	6
Nitrogen	N	7
Oxygen	O	8
Sodium	Na	11
Magnesium	Mg	12
Chlorine	Cl	17
Calcium	Ca	20

1. Study each marking. Write what it means. Then state the total number of atoms represented when possible.

Marking	What does it show?	Total atoms?
3H ₂		
O, atomic number 8		
Cl ⁻		

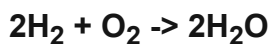
Reaction Atom Inventory

Use symbols, coefficients, and subscripts to identify elements and count atoms

Name: _____ Date: _____

Part 1 - Read the Formula (continued)

2. For the reaction below, name each element and count its atoms on each side of the arrow.



Element name and symbol	Reactant atoms	Product atoms

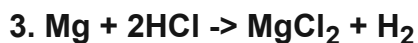
Reaction Atom Inventory

Use symbols, coefficients, and subscripts to identify elements and count atoms

Name: _____ Date: _____

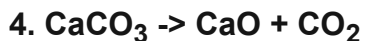
Part 2 - Inventory Both Sides

Directions: Complete an atom inventory for each reaction. First list every element shown. Then count all atoms of that element on the reactant side and product side. Use the reference in Part 1. Circle Yes only if every element has matching counts.



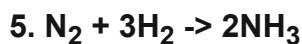
Element name and symbol	Reactant atoms	Product atoms

Counts match for every element: Yes / No



Element name and symbol	Reactant atoms	Product atoms

Counts match for every element: Yes / No



Element name and symbol	Reactant atoms	Product atoms

Counts match for every element: Yes / No

Reaction Atom Inventory

Use symbols, coefficients, and subscripts to identify elements and count atoms

Name: _____ Date: _____

Part 2 - Inventory Both Sides (continued)

6. In 1-2 sentences, explain why the 3 in 3H_2 changes the atom count, but the 8 in oxygen's atomic number does not.

Reaction Atom Inventory

Use symbols, coefficients, and subscripts to identify elements and count atoms

Answer Key and Teaching Notes

Setup: Print and supply all student pages, keeping teacher-key pages separate. Students need pencils and the Part 1 element reference. No additional materials are needed. Students may keep Part 1 visible while completing Part 2.

Teaching script: “Today, use the periodic table information to identify symbols. Read a coefficient as a multiplier. Read a subscript as atoms in one formula unit. Atomic numbers identify elements, and charges describe electrical charge; neither is an atom-count instruction. For each reaction, count each element separately on both sides of the arrow.”

Observe: As students work, check whether they (1) use the symbol-to-element reference accurately, (2) multiply each subscript by a coefficient, and (3) do not use atomic number or charge as an atom count. Ask: “What number is telling you how many formula units there are?” Record a quick checkmark for each behavior. Reteach with one formula if a student treats a charge or atomic number as a subscript.

1. 3H_2 : coefficient 3 means three H_2 units; subscript 2 means two H atoms per unit; $3 \times 2 = 6$ H atoms. O, atomic number 8: 8 identifies oxygen; one O symbol represents 1 oxygen atom. Cl^- : one chlorine atom with a 1- charge; the charge does not change the atom count.

2. Hydrogen (H): reactants $2 \times 2 = 4$; products $2 \times 2 = 4$. Oxygen (O): reactants 2; products $2 \times 1 = 2$.

3. Magnesium (Mg): 1 and 1. Hydrogen (H): $2 \times 1 = 2$ and 2. Chlorine (Cl): $2 \times 1 = 2$ and 2. Yes.

4. Calcium (Ca): 1 and 1. Carbon (C): 1 and 1. Oxygen (O): 3 and $1 + 2 = 3$. Yes.

5. Nitrogen (N): 2 and $2 \times 1 = 2$. Hydrogen (H): $3 \times 2 = 6$ and $2 \times 3 = 6$. Yes.

6. Sample response: “The coefficient 3 means there are three H_2 units, so it multiplies the two hydrogen atoms in each unit. Oxygen’s atomic number 8 identifies which element O is and does not tell how many oxygen atoms are in the formula.” Accept equivalent explanations that distinguish identity from atom count.