

Balancing Chemical Equations

Given and Introduction:

Given: Aqueous sodium sulfate reacts with aqueous barium bromide to form aqueous sodium bromide and solid barium sulfate.

The task is to write the balanced chemical equation for the reaction, including the physical states of the reactants and products.

Step 1: Write the chemical formulas of all reactants and products

The chemical formulas for the given compounds are:

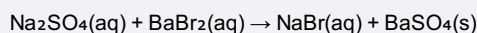
- Sodium sulfate: Na_2SO_4
- Barium bromide: BaBr_2
- Sodium bromide: NaBr
- Barium sulfate: BaSO_4

Explanation: The chemical formulas for each compound are written based on their given names and standard chemical nomenclature.

Supporting Statement: Properly identifying the chemical formulas ensures the equation is established correctly.

Step 2: Write the unbalanced chemical equation with physical states

The unbalanced chemical equation with physical states is written as follows:

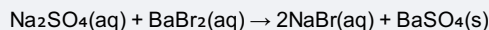


Explanation: The physical states are added where (aq) stands for aqueous solution and (s) stands for solid.

Supporting Statement: Including physical states helps in understanding the reaction conditions.

Step 3: Balance the sodium (Na) atoms

The unbalanced equation has 2 sodium atoms on the reactants side (from Na_2SO_4) and 1 sodium atom on the products side (from NaBr). To balance, a coefficient of 2 is placed in front of NaBr :



Explanation: Coefficients are used to balance the number of each type of atom on both sides of the equation.

Supporting Statement: Balancing each atom type ensures the law of conservation of mass is upheld.

Step 4: Verify the balance of remaining atoms

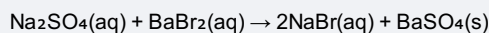
- Sodium (Na): 2 on each side
- Sulfur (S): 1 on each side
- Oxygen (O): 4 on each side
- Barium (Ba): 1 on each side
- Bromine (Br): 2 on each side

All atoms are balanced, confirming the reaction is correctly balanced.

Explanation: Each type of atom is rechecked to ensure that the number of atoms on both sides of the equation is equal.

Supporting Statement: Verifying ensures no mistakes were made during the balancing process.

Final Solution:



Explanation: This final equation correctly represents the reaction with the physical states and balanced atom counts for all involved elements.