The Missing Mass in a Bicarbonate Test

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A classroom simulation heats solid sodium bicarbonate. It uses the equation below. The solid product remains in the sample holder. Both gas products leave the holder, but the model collects water separately from carbon dioxide.

$2NaHCO_3(s) \rightarrow Na_2CO_3(s) + H_2O(g) + CO_2(g)$

Reading	**Mass (g)**
Sample before the reaction	8.40
Solid after the reaction	5.30
Water collected	0.90

1 Find the mass of carbon dioxide released under the model. Use the change in sample mass and the collected water. [1]

Answer and work

2 Which comparison follows from the coefficients for water vapor and carbon dioxide?

(1) Equal masses of the gases form.

(2) Equal amounts in moles of the gases form.

(3) Twice as many moles of water form.

(4) The gases have the same molar mass.

A student repeats the simulation but forgets the water measurement and assigns the entire mass loss to carbon dioxide.

3 Explain how that would affect the estimated carbon dioxide mass. Use the equation. [1]

Answer and work

4 Using 44.0 g/mol for CO_2, calculate how many moles of sodium bicarbonate reacted in the original simulation. [1]

Answer and work