Accounting for Solids After a Model Filtration

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

A class simulates mixing sodium carbonate and calcium chloride solutions. The model reacts 1.00 mmol of each starting compound completely. Calcium carbonate forms solid particles that the filter traps. Sodium chloride remains dissolved and passes through.

$Na_2CO_3(aq) + CaCl_2(aq) \rightarrow CaCO_3(s) + 2NaCl(aq)$

1 Calculate the amount of dissolved sodium chloride produced. Show how the coefficient in the equation enters the calculation. [1]

Answer and work

2 Where does the model predict most of the sodium chloride is immediately after filtration?

(1) In the trapped calcium carbonate solid

(2) In the clear liquid that passed through

(3) In the air above the filter

(4) Divided equally between the trapped solid and the air

The class dries the trapped solid and separately removes all the water from the clear liquid. It uses molar masses of 100.1 g/mol for $CaCO_3$ and 58.4 g/mol for NaCl. No solid is lost.

3 Estimate the dry solid mass obtained from each part. Show how the amounts and molar masses enter the results. [1]

Answer and work

4 A student says the clear liquid contained no products because it showed no visible solid. Explain why the dried liquid result is inconsistent with that claim. [1]

Answer and work