Mass-to-Mass Stoichiometry

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Use the 2025 Chemistry Reference Tables. Use a balanced equation to convert between moles of substances.

1 Which sequence converts the mass of a reactant to the predicted mass of a product?

(1) Mass reactant → moles reactant → moles product → mass product

(2) Mass reactant → mass product → moles product → moles reactant

(3) Mass reactant → moles product → mass product → moles reactant

(4) Mass reactant → formula mass product → mass reactant → moles product

2 For $2H_2 + O_2 \rightarrow 2H_2O$, calculate the mass of water formed from 4.04 g H_2 with excess O_2. Show the mole ratio. [1]

Answer and work

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3 For $N_2 + 3H_2 \rightarrow 2NH_3$, which conversion factor takes moles of N_2 to moles of NH_3?

(1) 1 mol NH_3/2 mol N_2

(2) 3 mol NH_3/1 mol N_2

(3) 2 mol NH_3/1 mol N_2

(4) 2 mol N_2/1 mol NH_3

4 For $N_2 + 3H_2 \rightarrow 2NH_3$, a student multiplies 10.0 g of N_2 by 2 to predict the mass of NH_3. Explain the mistake. [1]

Answer and work

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_____

Products from a Limestone Sample

Use the information below to answer the questions.

A model of limestone processing assumes all calcium carbonate decomposes by $CaCO_3 \rightarrow CaO + CO_2$. Other material in the rock is unchanged. The table gives masses for one dry sample.

Sample part	**Mass (g)**
Whole rock	50.0
Calcium carbonate in the rock	25.0

5 Which mass should be converted to moles to calculate CaO yield from this sample?

(1) 25.0 g of $CaCO_3$

(2) 50.0 g of $CaCO_3$

(3) 25.0 g of CaO

(4) 50.0 g of CO_2

6 Calculate the predicted mass of CaO. Show how the mass of $CaCO_3$ and the equation are used. [1]

Answer and work

7 Which mass of CO_2 is produced in the model?

(1) 5.50 g

(2) 11.0 g

(3) 14.0 g

(4) 25.0 g

8 The solid residue has less mass than the original rock. Explain how the model accounts for the difference. [1]

Answer and work