ANSWER KEY.

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Solution Stoichiometry

Chemistry | ANSWER KEY

Moles are the bridge: L × M → mol A → mole ratio → mol B → grams or liters of B. Change mL to L first. Use coefficients, never subscripts.

1. $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$. What mass of $BaSO_4$ forms from 30.0 mL of 0.150 M $BaCl_2$ with excess Na_2SO_4?

Moles $BaCl_2$: 30.0 mL = 0.0300 L; 0.150 M × 0.0300 L = 0.004500 mol
Mole ratio: 0.004500 × (1 mol $BaSO_4$ / 1 mol $BaCl_2$) = 0.004500 mol $BaSO_4$
Grams: 0.004500 mol × 233.40 g/mol = 1.050 g
Answer: 1.05 g $BaSO_4$

2. $CaCl_2 + 2AgNO_3 \rightarrow 2AgCl + Ca(NO_3)_2$. What volume of 0.200 M $AgNO_3$ reacts completely with 15.0 mL of 0.300 M $CaCl_2$?

Moles $CaCl_2$: 15.0 mL = 0.0150 L; 0.300 M × 0.0150 L = 0.004500 mol
Mole ratio: 0.004500 × (2 mol $AgNO_3$ / 1 mol $CaCl_2$) = 0.009000 mol $AgNO_3$
Volume: 0.009000 mol ÷ 0.200 M = 0.04500 L
Answer: 45.0 mL

3. $Mg + 2HCl \rightarrow MgCl_2 + H_2$. What mass of Mg reacts with 25.0 mL of 2.00 M HCl?

Moles HCl: 25.0 mL = 0.0250 L; 2.00 M × 0.0250 L = 0.05000 mol
Mole ratio: 0.05000 × (1 mol Mg / 2 mol HCl) = 0.02500 mol Mg
Grams: 0.02500 mol × 24.31 g/mol = 0.6078 g
Answer: 0.608 g Mg

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4. $2HCl + Ba(OH)_2 \rightarrow BaCl_2 + 2H_2O$. What volume of 0.100 M HCl neutralizes 30.0 mL of 0.150 M $Ba(OH)_2$?

Moles $Ba(OH)_2$: 30.0 mL = 0.0300 L; 0.150 M × 0.0300 L = 0.004500 mol

Mole ratio: 0.004500 × (2 mol HCl / 1 mol $Ba(OH)_2$) = 0.009000 mol HCl

Volume: 0.009000 mol ÷ 0.100 M = 0.09000 L

Answer: 90.0 mL

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5. $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$. What mass of the yellow precipitate PbI_2 forms from 50.0 mL of 0.100 M KI with excess $Pb(NO_3)_2$?

Moles KI: 50.0 mL = 0.0500 L; 0.100 M × 0.0500 L = 0.005000 mol

Mole ratio: 0.005000 × (1 mol PbI_2 / 2 mol KI) = 0.002500 mol PbI_2

Grams: 0.002500 mol × 461.00 g/mol = 1.153 g

Answer: 1.15 g PbI_2

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6. Balance first: $Al + HCl \rightarrow AlCl_3 + H_2$. Then find the mass of Al that reacts with 75.0 mL of 1.00 M HCl.

Balanced: $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$

Moles HCl: 75.0 mL = 0.0750 L; 1.00 M × 0.0750 L = 0.07500 mol

Mole ratio: 0.07500 × (2 mol Al / 6 mol HCl) = 0.02500 mol Al

Grams: 0.02500 mol × 26.98 g/mol = 0.6745 g

Answer: 0.675 g Al

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