You can combine all three steps on one line if you like!

① $159.80\ g\ Br_2 = mol\ Br_2$ ② $2\ mol\ Al = 3\ mol\ Br_2$ ③ $26.98\ g\ Al = mol\ Al$

$$25.0\ g\ Br_2 \times \frac{mol\ Br_2}{159.80\ g\ Br_2} \times \frac{2\ mol\ Al}{3\ mol\ Br_2} \times \frac{26.98\ g\ Al}{mol\ Al} = \boxed{2.81\ g\ Al}$$

① ② ③

Things we can do:

If we have ...	... and we need ...	Use ...
MASS	MOLES	FORMULA WEIGHT
SOLUTION VOLUME	MOLES	MOLAR CONCETRATION (MOLARITY)
MOLES OF A	MOLES OF B	BALANCED CHEMICAL EQUATION

Example:

How many milliliters of 6.00M hydrochloric acid is needed to completely react with 25.0 g of sodium carbonate?

$$2HCl(aq) + Na_2CO_3(s) \longrightarrow H_2O(l) + CO_2(g) + 2NaCl(aq)$$

---

1 - Convert 25.0 g sodium carbonate to moles. Use FORMULA WEIGHT.
2 - Convert moles sodium carbonate to moles HCl. Use CHEMICAL EQUATION.
3 - Convert moles HCl to volume HCl solution. Use MOLARITY (6.00 M HCl)

---

① Na_2CO_3: Na: 2×22.99
C: 1×12.01
O: 3×16.00
$105.99\ g\ Na_2CO_3 = 1\ mol\ Na_2CO_3$

$$25.0\ g\ Na_2CO_3 \times \frac{1\ mol\ Na_2CO_3}{105.99\ g\ Na_2CO_3} = 0.2358713086\ mol\ Na_2CO_3$$

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② $2\ mol\ HCl = 1\ mol\ Na_2CO_3$

$$0.2358713086\ mol\ Na_2CO_3 \times \frac{2\ mol\ HCl}{1\ mol\ Na_2CO_3} = 0.4717426172\ mol\ HCl$$

Example:

How many milliliters of 6.00M hydrochloric acid is needed to completely react with 25.0 g of sodium carbonate?

$$2HCl(aq) + Na_2CO_3(s) \longrightarrow H_2O(l) + CO_2(g) + 2NaCl(aq)$$

1 - Convert 25.0 g sodium carbonate to moles. Use FORMULA WEIGHT.
2 - Convert moles sodium carbonate to moles HCl. Use CHEMICAL EQUATION.
3 - Convert moles HCl to volume HCl solution. Use MOLARITY (6.00 M HCl)

③ $6.00\ mol\ HCl = L$

$$0.471742617\ 2\ mol\ HCl \times \frac{L}{6.00\ mol\ HCl} = 0.0786\ L\ of\ 6.00\ M\ HCl$$

Since the problem asks for the volume in mL, do a quick unit conversion.

$$mL = 10^{-3} L$$

$$0.0786\ L \times \frac{mL}{10^{-3} L} = \boxed{78.6\ mL\ of\ 6.00\ M\ HCl}$$

42.081 g/mol 53.064 g/mol

$$4\,C_3H_6 + 6\,NO \longrightarrow 4\,C_3H_3N + 6\,H_2O + N_2$$

propylene acrylonitrile

Calculate how many grams of acrylonitrile could be obtained from 651 g of propylene, assuming there is excess NO present.

1- Convert 651 g propylene to moles using FORMULA WEIGHT.
2 - Convert moles propylene to moles acrylonitrile. Use CHEMICAL EQUATION.
3 - Convert moles acrylonitrile to mass. Use FORMULA WEIGHT.

---

① $42.081\,g\,C_3H_6 = 1\,mol\,C_3H_6$ ② $4\,mol\,C_3H_6 = 4\,mol\,C_3H_3N$ ③ $53.064\,g\,C_3H_3N = 1\,mol\,C_3H_3N$

$$651\,g\,C_3H_6 \times \frac{1\,mol\,C_3H_6}{42.081\,g\,C_3H_6} \times \frac{4\,mol\,C_3H_3N}{4\,mol\,C_3H_6} \times \frac{53.064\,g\,C_3H_3N}{1\,mol\,C_3H_3N} = \boxed{821\,g\,C_3H_3N}$$

① ② ③

151.90 g/mol

$$10\,FeSO_4 + 2\,KMnO_4 + 8\,H_2SO_4 \rightarrow 5\,Fe_2(SO_4)_3 + 2\,MnSO_4 + K_2SO_4 + 8\,H_2O$$

How many mL of 0.250M potassium permangenate are needed to react with 3.36 g of iron(II) sulfate?

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1 - Convert 3.36 g iron(II) sulfate to moles. Use FORMULA WEIGHT.
2 - Convert moles iron(II) sulfate to moles potassium permangenate. Use CHEMICAL EQUATION..
3 - Convert moles potassium permangenate to volume. Use MOLARITY.

① $151.90\,g\,FeSO_4 = 1\,mol\,FeSO_4$ ② $10\,mol\,FeSO_4 = 2\,mol\,KMnO_4$ ③ $0.250\,mol\,KMnO_4 = 1\,L$

$$3.36\,g\,FeSO_4 \times \frac{mol\,FeSO_4}{151.90\,g\,FeSO_4} \times \frac{2\,mol\,KMnO_4}{10\,mol\,FeSO_4} \times \frac{L}{0.250\,mol\,KMnO_4} = 0.0177\,L$$

① ② ③

Since the problem asks for answer in mL, let's do a unit conversion...

$mL = 10^{-3}\,L$

$$0.0177\,L \times \frac{mL}{10^{-3}\,L} = \boxed{17.7\,mL\ of\ 0.250M\ KMnO_4}$$