Several Step Mole Problems

Video Workbook with Dr. B.

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Sometimes we need to do more than one conversion to get an answer.

Example: Convert 32.1 grams of CO_2 gas to liters.

$$\frac{32.1\ g}{44.01\ g/mol} = 0.729\ mol\ CO_2$$

First, convert grams to moles.

$$0.729\ mol\ CO_2 \times \frac{22.4\ L}{mol} = 16.3\ L$$

Second, convert moles to liters.

Example: How many molecules of 19.7L of N_2 gas?

$$\frac{19.7\ L}{22.4\ L/mol} = 0.879\ mol$$

First, convert liters to moles.

$$0.879\ mol \times 6.02 \times 10^{23}\ \frac{molecules}{mol} = 5.29 \times 10^{23}\ molecules$$

Second, convert moles to molecules.

This type of conversions will require two steps:

grams to liters
grams to particles

liters to grams
liters to particles

For multistep problems you'll always convert to moles first. Once you have moles you can then convert to the other unit.

Practice with Video Explanations

1. Convert 67.72 grams O_2 to liters. https://youtu.be/hcutpp1ukQQ
2. Convert 24.49 grams of H_2O to molecules: https://youtu.be/6Su5l9FbtJk
3. Convert 37.22 grams H_2 to Liters: https://youtu.be/0u9cyA7M9HU
4. Convert grams 3.5 grams O_2 to molecules: https://youtu.be/YEi2rvFZe1U
5. How many molecules in 1 L of liquid water? https://youtu.be/kbkC_osp30A

Answers (Note, depending how you round you may get a slightly different answer.

Problem 1: 47.40L

Problem 2: 8.16×10^{23} molecules

Problem 3: 412.74L

Problem 4: 6.6×10^{22} molecules

Problem 5: 3.3×10^{25} molecules

Report errors and suggestions to DrB@breslyn.org

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