Concentration Qualitatively

DR. MIOY T. HUYNH
YALE UNIVERSITY
CHEMISTRY 161
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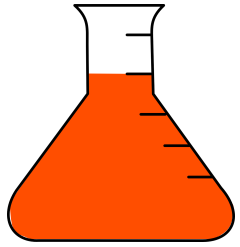
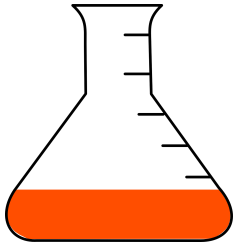
What is concentration?

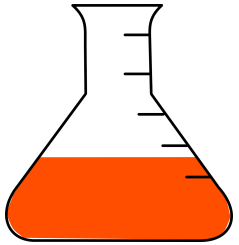
QUANTITY (AMOUNT) PER VOLUME

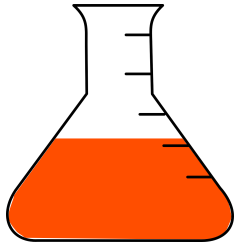
(It's like a density!)



Now pour some into each flask.







Q1: Which flask is the most concentrated?

A1: The concentrations are the same!

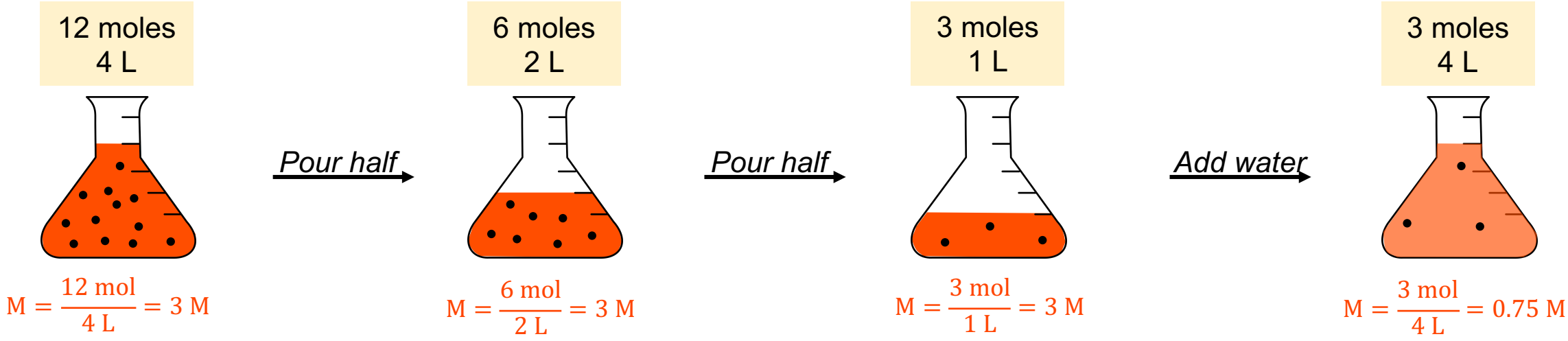
Q2: How can we change the concentration?

A2: Add more powder mix … or add/remove water.

MOLARITY (M): Concentration of solution

$$\text{Concentration} = \frac{\text{moles of solute}}{\text{Volume (L) of solution}} \quad ; \quad \text{M} = \frac{\text{mol}}{\text{L}}$$

Think about what concentration means before getting into the math.



Each black dot represents a mole (the quantity/amount)

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Remember that this is just a ratio of moles per volume.

It does not mean you have 8 moles of sugar or that you have 1 L of solution.

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$$2.50\ \text{M} = \frac{\text{x mol}}{300\ \text{mL} \times \frac{1\ \text{L}}{1000\ \text{mL}}}$$

$$\text{x} = 0.750\ \text{mol sugar}$$

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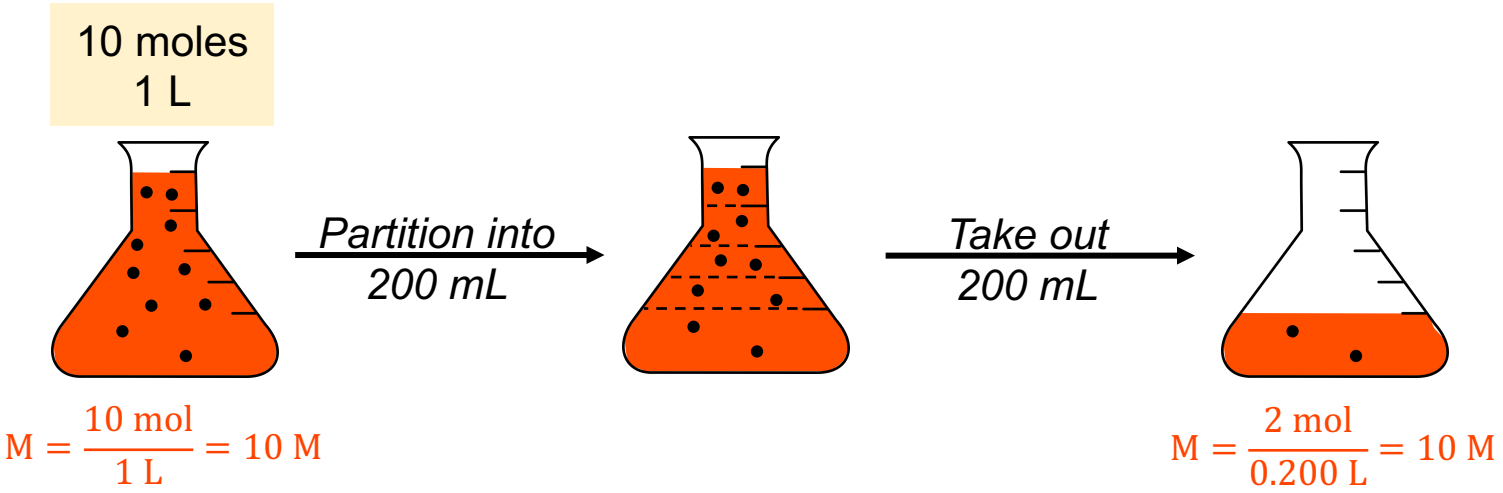

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Now, determine the new concentration if double the volume of the solution:

$$\text{Concentration} = \frac{\text{\# moles}}{\text{Volume (L)}}$$

$$= \frac{1.00\ \text{mol}}{(250.0\ \text{mL} + 250.0\ \text{mL}) \times \frac{1\ \text{L}}{1000\ mL}}$$

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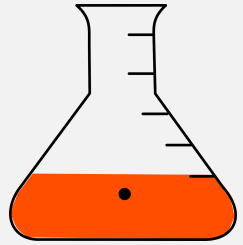
1 mole
250 mL



$$\text{M} = \frac{1.00\ \text{mol}}{0.2500\ \text{L}} = 4.00\ \text{M}$$

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