

5. DILUTIONS

CH30S

UNIT 3 - SOLUTIONS

WIEBE

1

WHAT IS A DILUTION?

Concentrated solutions have a relatively **high** molarity.

Dilute solutions have a relatively **low** molarity.

It is often **faster** to prepare a standard solutions by **diluting** a more concentrated solution.

The following **equation** can be used to solve **dilution problems** – when **water** is **added** or **removed** from a solution.



$$M_1 V_1 = M_2 V_2$$

M_1 = the initial molarity M_2 = the final molarity

V_1 = the initial volume V_2 = the final volume

2

The Dilution Formula – How it Works

If we have 1 L of 3 M HCl, what is the new concentration if we dilute the acid to 6 L by adding 5 L of water?

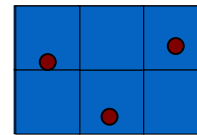
$$1 \text{ L} \times \frac{3 \text{ mol}}{1 \text{ L}} = 3 \text{ mol HCl}$$

$$M_1 v_1 = 3 \text{ mol}$$



$$\frac{3 \text{ mol HCl}}{6 \text{ L}} = 0.5 \text{ M}$$

$$M_2 v_2 = 3 \text{ mol}$$



Dilutions spread the same quantity of solute over a larger volume of solution!

3

A Practical Dilution...



Every can of Minute Made concentrated frozen orange juice has a volume of 250 mL and a molarity of 1.17 M $\text{C}_{12}\text{H}_{22}\text{O}_{11}$. To prepare a jug of juice, 3 cans of water are added to one can of frozen juice.

DETERMINE THE MOLARITY OF SUCROSE IN A PREPARED JUG OF OJ.

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DETERMINE THE MOLARITY OF SUCROSE IN A PREPARED JUG OF OJ.

5



EXAMPLE # 1

What volume of 0.755 M sodium chloride solution is required to prepare 250.0 mL of a 0.500 M solution?

6

EXAMPLE #2

A student measures 100.0 mL of a 5.0 M potassium chloride solution and adds enough water to it to make the volume 2.0 L. What will be the molarity of this new solution?

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EXAMPLE #3

How much water would you need to add to 200.0 mL of a 1.50 M sodium nitrate solution to dilute it down to 0.250 M?

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