CST:

Chem 6d.e

Holey Moley!

151

ChemCatalyst:

Q: How many grams of glucose are in the blood of an average human?	Blood volume = 5.5L [Glucose] = 0.0056M Molar Mass of glucose = 180.0g/mol

Notes:

None! Go straight to the activity

:)

Holey Moley

Name: _____

Period:_____ Date: _____

Purpose: You will practice solving problems in which you convert between mass of solute, moles of solute, and liters of solution using molecular weight and molarity.

Part I: Sample problems involving molarity

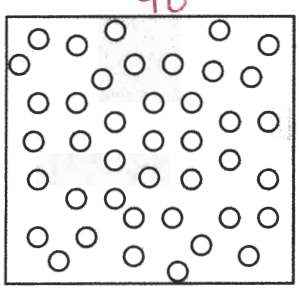
1. The following table shows the relationship between mass of sucrose, moles of sucrose, volume of sucrose solution, and the molarity of sucrose solution. The molecular formula for sucrose is $C_{12}H_{22}O_{11}$. Complete the table.

Mass	Moles	Volume	Molarity
342 g	1.0 mole	1.0 L	1.0 M
34.2 g	0.10 mole	1.0 L	0.10 M
3.42 g	0.010 mole	100 mL	0.10 M
0.342 g	0.0010 mol	10 mL	0.10 M
27.4 g	0.080 moles	1.0 L	0.080 M
17.1 g	0.050 mol	1.0 L	0.050 M
6.84 g	0.02 mol	1.0 L	0.02 M
27.4 g	0.080 moles	500 mL	0.040 M
17.1 g	0.050 moles	500 mL	0.025 M
6.84 g	0.02 mol	500 mL	0.010 M

2. What is the molecular weight of sucrose? 342 g

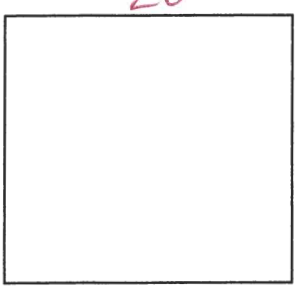
3. Suppose you remove a very tiny volume of solution from a 0.10 M sucrose solution so that it contains only 40 sucrose molecules as shown in the box below. (You couldn't actually remove a volume this small!). If you removed the same volume from a solution that is 0.50 M and one that is 0.10 M, how many sucrose molecules would you have? Sketch your answers in the boxes provided.

40



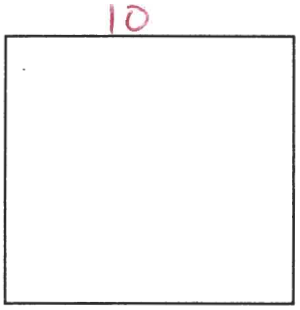
0.1 M sucrose

20



0.05 M sucrose

10



0.01 M sucrose

Making Sense Notes:

- How do I dilute stock solutions?

- stock solution: an already made, concentrated solution
  - you can use a stock solution to prepare more dilute solutions
  - total # of moles of solute does NOT change during dilution
- use the formula:

$$M_1V_1 = M_2V_2$$

M_1 = Molarity of stock
V_1 = volume of stock
M_2 = Molarity of dilute
V_2 = Volume of dilute

- ex: If I have 1.0L of 5.0M NaCl, how much do I need to make 1.0L of 2.5M diluted solution?

$$M_1V_1 = M_2V_2$$

$$\frac{(5.0M)(V_1)}{(5.0M)} = \frac{(2.5M)(1.0L)}{(5.0M)} = \boxed{0.50L}$$

- How do I solve stoichiometry problems w/ molarity?

- If you are given volume & molarity:
  1. solve for moles (moles = M × L)
  2. convert moles to grams
  3. use stoichiometry bridges to get to destination
  - ex: if 350.0mL of 0.500M NaCl are added to KBr, how many grams of KCl will be produced?

moles = M × L

$NaCl + KBr \rightarrow NaBr + KCl$

$= 0.500 \times .350L = 0.175$ moles NaCl

$$0.175 \text{ moles NaCl} \left| \frac{1 \text{ mol KCl}}{1 \text{ mol NaCl}} \right| \frac{74.55 \text{ g KCl}}{1 \text{ mol KCl}} = \boxed{13.0 \text{ g KCl}}$$

- If you are give grams of one substance & asked for Molarity of different substance:
  1. use stoich to go from grams to moles
  2. $M = \frac{\text{mol}}{L}$