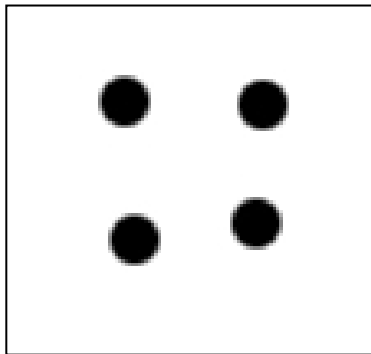
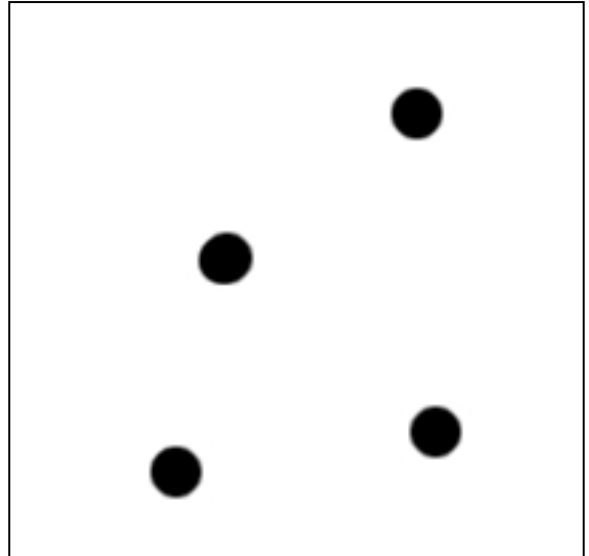


Dilution of Stock Solutions

- a solution is made less concentrated by adding more solvent
- the amount of solute does not change



concentrated
solution
(4 units of solute)



dilute
solution
(4 units of solute)

stock solution - a concentrated form of a solution

e.g. What volume in mL's of 17.8 mol/L H_2SO_4 is required to make 250 mL of 0.50 mol/L H_2SO_4 ?

dilute solution

$$\begin{aligned} V &= 250 \text{ mL} \\ &= 0.250 \text{ L} \end{aligned}$$

$$C = 0.50 \text{ mol/L}$$

$$\begin{aligned} n &= C \times V \\ &= 0.50 \text{ mol/L} \times 0.250 \text{ L} \\ &= 0.125 \text{ mol} \end{aligned}$$

stock solution

$$C = 17.8 \text{ mol/L}$$

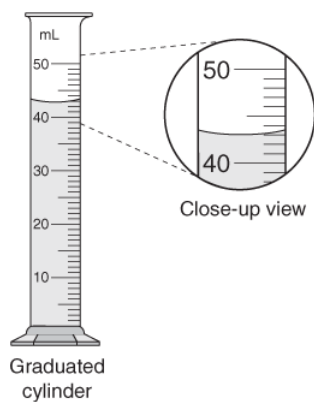
$$n =$$

$$V = \frac{n}{C} =$$

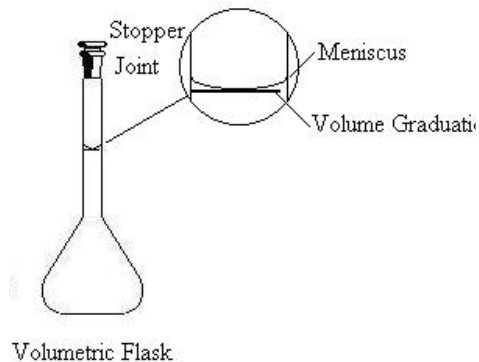
Specialized Glassware for Measuring Volume

1. graduated cylinder
 - available in a variety of volumes
2. volumetric flask
 - available in a variety of volumes
 - used to transfer **exact** volumes of solutions
3. pipette
 - available in a variety of volumes
 - used to transfer **exact** volumes of solutions

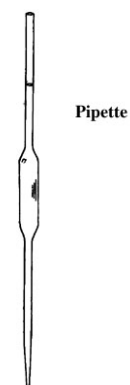
1. graduated cylinder



2. volumetric flask



3. pipette



Preparation of Solutions for Labs

- two methods
 - from a stock solution
 - from a solid

e.g. How would you prepare 100 mL of 2.0 mol/L NaCl solution using a 8.0 mol/L NaCl solution?

dilute solution

$$V = 100 \text{ mL} \\ = 0.100 \text{ L}$$

$$C = 2.0 \text{ mol/L}$$

$$n = C \times V$$

$$= (2.0 \text{ mol/L}) \times 0.100 \text{ L} \\ = 0.20 \text{ mol}$$

stock solution

$$C = 8.0 \text{ mol/L}$$

$$n = 0.20 \text{ mol}$$

$$V = \frac{n}{C} = \underline{0.025 \text{ mol}}$$

$$C = 8.0 \text{ mol/L}$$

$$= 0.025 \text{ mL}$$

- measure 25 mL of stock solution in a pipette and transfer it to a 100 mL volumetric flask. Add water until the meniscus sits exactly on the etched line.

e.g. How would you prepare 100 mL of a 0.30 mol/L KI solution starting with solid KI?

$$V = 100 \text{ mL} \\ = 0.100 \text{ L}$$

$$C = 0.300 \text{ mol/L}$$

$$n = C \times V \\ = 0.30 \text{ mol/L} \times 0.100 \text{ L} \\ = 0.030 \text{ mol}$$

$$M_{\text{KI}} = 39.10 + 126.90 \\ = 166.00 \text{ g/mol}$$

$$0.030 \text{ mol KI} \times \frac{166.00 \text{ g KI}}{1 \text{ mol KI}} \\ = 5.0 \text{ g KI}$$

- measure 5.0 g of KI on a balance and transfer the solid to a 100 mL volumetric flask. Add water until the meniscus sits exactly on the etched line.

SAFETY NOTE: never add water directly to concentrated acid!!!

- 1) fill the vessel half full of water
- 2) add acid
- 3) dilute with more water