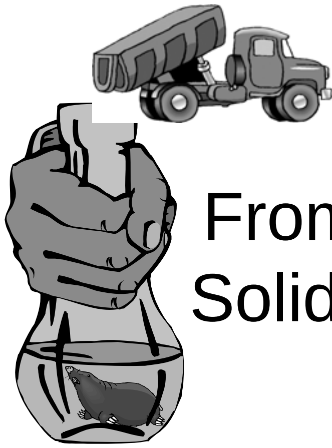
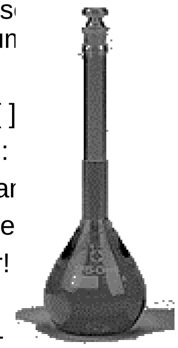
Making Molar Solutions From Solids



What are molar solutions?



A molar solution is one that express
"concentration" in moles per volun

Usually the units are in mol/L

mol/L can be abbreviated as M or [ ]

Molar solutions are prepared using:

- a balance to weigh moles (as grar
- a volumetric flask to measure litre

L refers to entire volume, not water!

Because the units are mol/L,
we can use the equation M = n/L

Alternatively, we can use the factor label method

Calculations with molar solutions

Q: How many moles of NaCl are required to make 7.5 L of a 0.10 M solution?

M=n/L, n = 0.10 M x 7.5 L = 0.75 mol

$$\# \text{ mol NaCl} = 7.5\ \cancel{L} \times \frac{0.10 \text{ mol NaCl}}{1\ \cancel{L}} = 0.75 \text{ mol}$$

But in the lab we weigh grams not moles, so …

Q: How many <u>grams</u> of NaCl are required to make 7.5 L of a 0.10 M solution?

\# g NaCl =

$$7.5\ \cancel{L} \times \frac{0.10\ \cancel{\text{mol NaCl}}}{1\ \cancel{L}} \times \frac{58.44 \text{ g NaCl}}{1\ \cancel{\text{mol NaCl}}} = 4\underline{3}.83 \text{ g}$$

Read pages 288 – 290. Do Q 19 - 22

Practice making molar solutions

1. Calculate # of grams required to make 100 mL of a 0.10 M solution of NaOH (see above).
2. Get volumetric flask, plastic bottle, 100 mL beaker, eyedropper. Rinse all with tap water.
3. Fill a beaker with distilled water.
4. Pour 20 - 30 mL of H_2O from beaker into flask.
5. Weigh NaOH. Add it to flask. ***<u>Do step 5 quickly</u>***.
6. Mix (by swirling) until the NaOH is dissolved.
7. Add distilled H_2O to just below the colored line.
8. Add distilled H_2O to the line using eyedropper.
9. Place solution in a bottle. Place label (tape) on bottle (name, date, chemical, molarity). Place bottle at front. Rinse & return equipment.

More Practice Questions

1. How many grams of nitric acid are present in 1.0 L of a 1.0 M HNO_3 solution?
2. Calculate the number of grams needed to produce 1.00 L of these solutions: a) 1.00 M KNO_3
   b) 1.85 M H_2SO_4 c) 0.67 M $KClO_3$
3. Calculate the # of grams needed to produce each:
   a) 0.20 L of 1.5 M KCl b) 0.160 L of 0.300 M HCl
   c) 0.20 L of 0.09 mol/L $AgNO_3$
   d) 250 mL of 3.1 mol/L $BaCl_2$
4. Give the molarity of a solution containing 10 g of each solute in 2.5 L of solution: a)H_2SO_4 b)$Ca(OH)_2$
5. Describe how 100 mL of a 0.10 mol/L NaOH solution would be made.

Answers & Notes