ANSWERS

calculating joules of a reaction

ChemiStry [illegible]

Stop in for help every day at lunch and Tues & Thurs after school!

After-hours question? Email me at home: cagenest@madison.k12.wi.us

Name ________

Period ________

1. Sulfur reacts with excess oxygen gas to produce sulfur trioxide. In the balanced equation, when 2 moles of sulfur react, 791.4 kilojoules are released

a) Write the balanced chemical equation

$1\,S_8 + 12\,O_2 \rightarrow 8\,SO_3 + 791\text{ kJ}$

b) In your answer to (a), include the energy term as either a reactant or product. In other words, to the balanced equation you wrote above, write 791.4 kJ onto either the right or left side, depending on whether you think the reaction took in or gave off energy.

c) Rewrite the balanced reaction but now show the energy term using ΔH notation.

$$S_8 + 12\,O_2 \rightarrow 8\,SO_3 \quad \boxed{\Delta H = -791\text{ kJ}}$$

d) Tell whether the reaction is endothermic or exothermic: ________

EXOTHERMIC

e) What mass of oxygen gas is consumed when 35 kJ are released in the reaction above?

$$35\text{ kJ} \times \left(\frac{12\text{ mol }O_2}{791\text{ kJ}}\right) \times \left(\frac{32\text{ grams }O_2}{1\text{ mol }O_2}\right) = 17\text{ grams }O_2$$

f) How much energy is released by the reaction when 50.0 grams of sulfur react?

$$50.0\text{g }S_8 \times \left(\frac{1\text{ mol }S_8}{256.48\text{ gram }S_8}\right) \times \left(\frac{791\text{ kJ}}{1\text{ mol }S_8}\right) = 154\text{ kJ}$$

2. Nitrogen gas and oxygen gas can combine to produce nitrogen monoxide, NO. In the balanced reaction when one mole of N_2 reacts, the reaction absorbs 88.0 kJ of energy from the surroundings.

a) Write the balanced chemical equation

88 + N_2 + O_2 → 2NO

88.0kJ

b) In your answer to (a), include the energy term as either a reactant or product. In other words, to the balanced equation you wrote above, write ~~88.0kJ~~ onto either the right or left side, depending on whether you think the reaction took in or gave off energy.

c) Rewrite the balanced reaction but now show the energy term using ΔH notation.

$N_2 + O_2 \rightarrow 2NO$

d) Tell whether the reaction is endothermic or exothermic: _____

e) What mass of nitrogen monoxide gas is produced when 35 kJ are absorbed in the reaction above?

f) How much energy is absorbed by the reaction when 0.697 grams of nitrogen react?

[Rerun of Friday's quiz question that was also on the Piggy Bank Worksheet and the Wheelbarrow Worksheet.]

3. Calculate the molarity of **each** ion present in the following solution. .A 0.04661 mole sample of calcium chloride is dissolved in enough water to make 225 mL of solution.

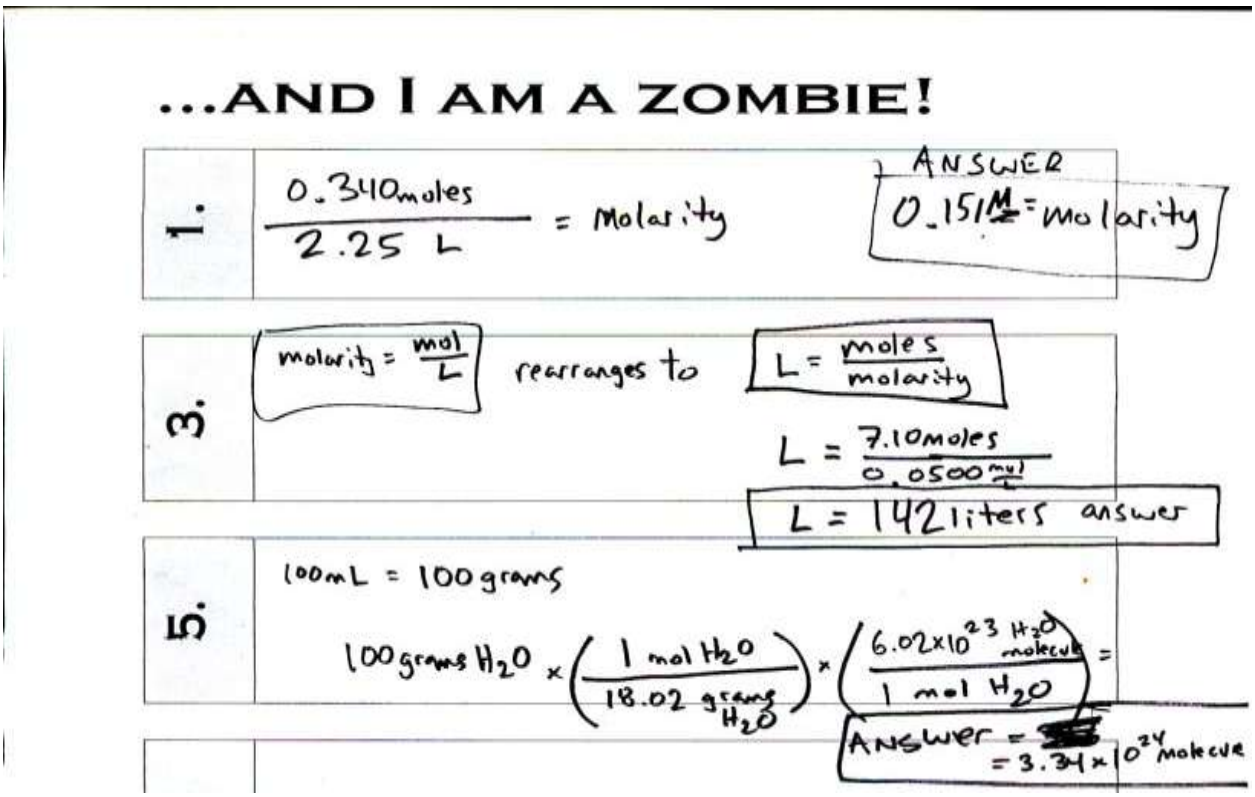
a) Determine the molar concentration of chloride ion [Ca^{2+}] in this solution

b) Determine the molar concentration of chloride ion [Cl-] in this solution

one	What is the molarity of solution made by dissolving 0.340 moles of NH_4Br in enough water to make 2.25 L of solution?

three	How many liters of solution must you make if you wish to use 7.10 moles of potassium bromide and you want the molarity to be 0.0500M?

five	How many water molecules are present in the water bottle at STATION A?



two	What is the molarity of solution made by dissolving 0.740 moles of NH_4Br in enough water to make 840. mL of solution?

four	If you dissolve 35.0 grams of aluminum chloride in enough water to make a solution with 300 mL what wil the molarity be?

six	What is the mass, in grams, of the molecules shown at STATION C?

2. Fix the units: 840 mL → 0.840 liters

molarity = $\frac{\text{moles}}{\text{L}}$ molarity = $\frac{0.740 \text{ mol}}{.840 \text{ L}}$

molarity = 0.881 M

4. $AlCl_3$ is $\begin{cases} 3 \times (35.45) = \\ 1 \times (26.98) = \end{cases}$ = 133.33 grams/mole

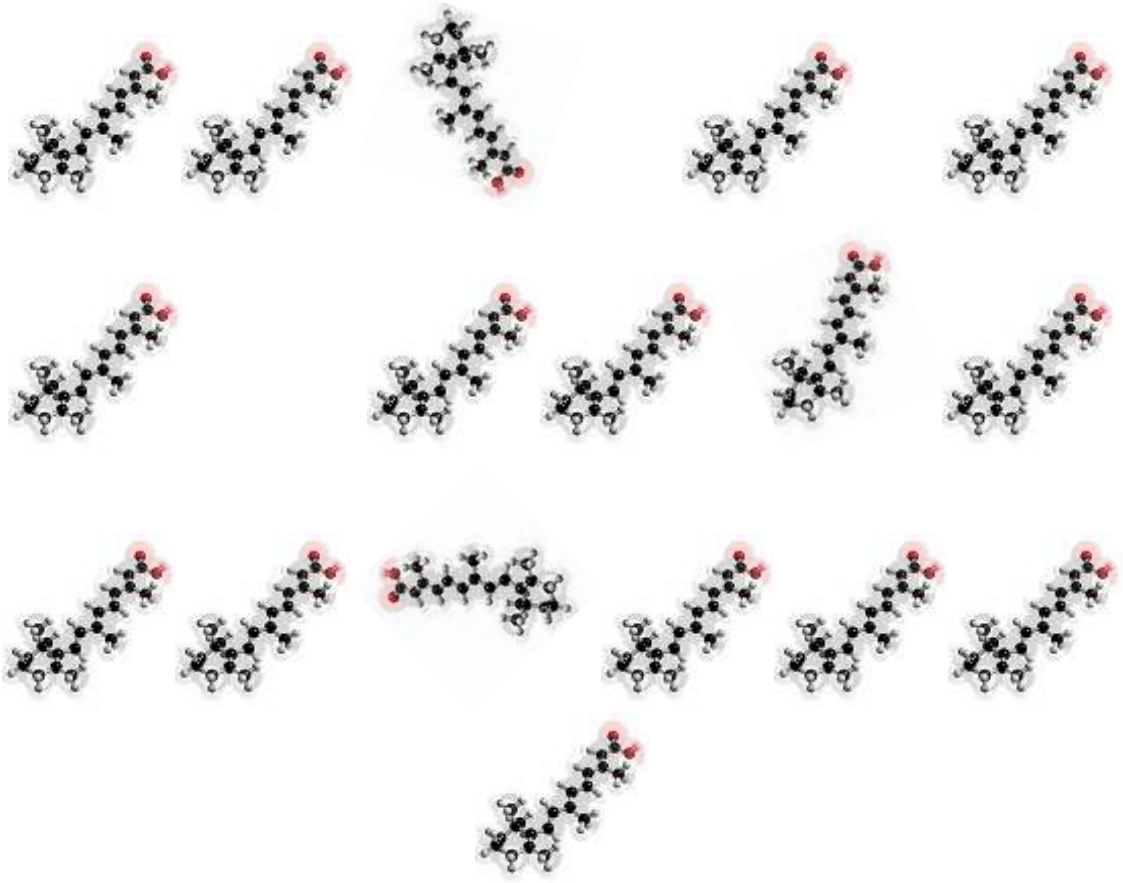
$35.0 \text{ g } AlCl_3 \times \left(\frac{1 \text{ mol } AlCl_3}{133.33 \text{ g } AlCl_3}\right) = 0.263 \text{ mol}_{AlCl_3}$

molarity = $\frac{0.263 \text{ mol}}{0.300 \text{ L}}$

molarity = 0.875 M

6. $17 \text{ molecules} \times \left(\frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ molecules}}\right) \times \left(\frac{286.45 \text{ gram}}{1 \text{ mole}}\right) = 8.09 \times 10^{-21} \text{ grams}$

The molecules at Station C



"retinol", a nutrient necessary for vision.
its molecular weight

is 286.45 grams per mole