

ANSWERS

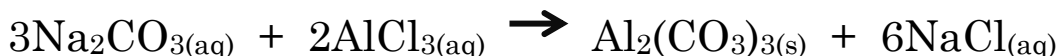
Friday – test

Purpose:

What do we need to know for Friday's test?

WARMUP (Choose One):

1) For the reaction below, what volume of 1.2M Na_2CO_3 is needed to react with 5.0 L of 0.30 M AlCl_3 ?



$$\Delta H = -677 \text{ KJ}$$

#1 STRATEGY:

Realize who is the lonely number: 5.0 liters AlCl_3
Realize the numbers in relationship are

0.30 M AlCl_3 because it is $\frac{0.30 \text{ mol}}{1 \text{ L AlCl}_3}$
two numbers:

and

1.20 M Na_2CO_3 is really two numbers: $\frac{1.20 \text{ moles}}{1 \text{ liter Na}_2\text{CO}_3}$

SOLUTION:

$$5.0 \text{ L AlCl}_3 \times \left(\frac{0.30 \text{ mol AlCl}_3}{1 \text{ L AlCl}_3} \right) \left(\frac{3 \text{ mol Na}_2\text{CO}_3}{2 \text{ mol AlCl}_3} \right) \left(\frac{1 \text{ L Na}_2\text{CO}_3}{1.2 \text{ mol Na}_2\text{CO}_3} \right) = 1.9 \text{ L Na}_2\text{CO}_3$$

2) How many grams of NaCl will form if the reaction gives off 2000. kJ of energy?

#2

$$2000. \text{ kJ} \left(\frac{6 \text{ mol NaCl}}{677 \text{ kJ}} \right) \left(\frac{58.45 \text{ grams NaCl}}{1 \text{ mol NaCl}} \right) = 1040 \text{ grams NaCl}$$

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ANSWERS

calculating joules of a reaction
CHEMISTRY
 Stop at the help every day at lunch and Tues. & Thurs. after school
 After-hours question? Email me at home: eageest@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



- 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.



- d) Tell whether the reaction is endothermic or exothermic: _____
 e) What mass of oxygen gas is consumed when 35 kJ are released in the reaction above?

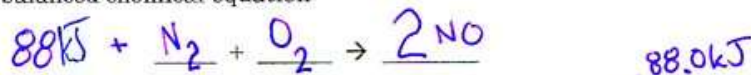
$$35 \text{ kJ} \times \left(\frac{12 \text{ mol O}_2}{791 \text{ kJ}} \right) \times \left(\frac{32 \text{ grams O}_2}{1 \text{ mol O}_2} \right) = 17 \text{ grams O}_2$$

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

$$50.0 \text{ g S}_8 \times \left(\frac{1 \text{ mol S}_8}{256.48 \text{ gram S}_8} \right) \times \left(\frac{791 \text{ kJ}}{1 \text{ mol S}_8} \right) = 154 \text{ kJ}$$

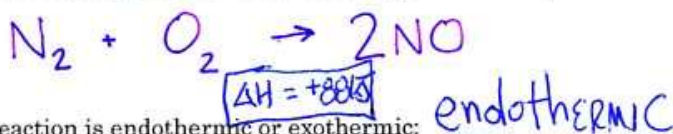
2. Nitrogen gas and oxygen gas can combine to produce nitrogen monoxide, NO. In the balanced reaction when one mole of N₂ reacts, the reaction absorbs 88.0 kJ of energy from the surroundings.

a) Write the balanced chemical equation



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.



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

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

$$35\text{kJ} \times \left(\frac{2 \text{ moles NO}}{88.0\text{kJ}} \right) \times \left(\frac{30.01 \text{ grams}}{1 \text{ moles NO}} \right) = 24 \text{ grams NO}$$

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

$$0.697 \text{ grams N}_2 \times \left(\frac{1 \text{ moles N}_2}{28.02 \text{ grams N}_2} \right) \times \left(\frac{88.0 \text{ kJ}}{1 \text{ moles N}_2} \right) = 2.19 \text{ kJ}$$

[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 [Ca²⁺] in this solution

$$.04661 \text{ moles CaCl}_2 \text{ makes } 0.04661 \text{ moles Ca}^{2+}$$

$$\text{so } \frac{.04661 \text{ moles Ca}^{2+}}{.225 \text{ liters}} = 0.207 \text{ M Ca}^{2+}$$

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

$$.04661 \text{ moles CaCl}_2 \text{ makes } 0.09322 \text{ moles Cl}^-$$

$$\text{so } \frac{.09322 \text{ moles Cl}^-}{.225 \text{ liters}} = 0.414 \text{ M Cl}^-$$