Honors Chemistry Chapter 16, 17, and 19 Jeopardy

Jennie L. Borders

Round 1 – Chapter 16 and 19

Vocabulary/ Solubility	Molarity, Dilutions, Percent Solutions	Colligative Properties	Acids and Bases	pH Square Problem	K and Titrations
100	100	100	100	100	100
200	200	200	200	200	200
300	300	300	300	300	300
400	400	400	400	400	400
500	500	500	500	500	500

Round 2 – Chapter 17

Click to go to Round 2

Vocabulary/Solubility 100

Define dilute and concentrated.

A dilute solution contains a small amount of solute.
A concentrated solution contains a large amount of solute.

Vocabulary/Solubility 200

Define miscible and immiscible.

Two liquids that will dissolve one another are miscible.
Two liquids that will not dissolve one another are immiscible.

Vocabulary/Solubility 300

What factor affects the amount of solute that a solvent will dissolve?

Temperature

Vocabulary/Solubility 400

What is the difference between unsaturated, saturated, and supersaturated?

*unsaturated – solvent contains less than the maxiumum amount of solute at a given temperature.

*saturated – solvent contains the maximum amount of solute at a given temperature.

*supersaturated – solvent contains more than the maximum amount of solute at a given temperature.

Vocabulary/Solubility 500

Explain how increasing the temperature, stirring, and crushing increase the rate of dissolving.

*Increasing the temperature speeds up the particles and causes more collisions.

*Stirring disperses the solute throughout the solvent.

*Crushing increases the surface area of the solute.

Molarity, Dilution, Percent Solutions 100

Calculate the molarity of a solution containing 1 mole of potassium chloride in 750mL of solution.

1.33M KCl

Molarity, Dilution, Percent Solutions 200

Calculate the number of grams of potassium permanganate in 850mL of 0.5M solution?

67.15g $KMnO_4$

Molarity, Dilution, Percent Solutions 300

How many milliliters of 0.500M KCl solution would you need to dilute to make 100mL of 0.100M KCl?

20mL

Molarity, Dilution, Percent Solutions 400

What is the %(v/v) of a solution containing 175mL of isopropyl alcohol that is diluted to a volume of 275mL with water?

63.64%

Molarity, Dilution, Percent Solutions 500

Calculate the number of moles of potassium nitrite needed to make 750g of 3%(m/m) solution.

0.26 mol KNO_2

Colligative Properties 100

What is a colligative property?

A property that depends on the amount of solute particles, not the type.

Colligative Properties 200

What are the 3 colligative properties that we talked about?

***Vapor pressure depression**
***Boiling point elevation**
***Freezing point depression**

Colligative Properties 300

How many particles are formed when 3 moles of aluminum oxide dissolves in water?

15 mol of particles

Colligative Properties 400

Which has the higher boiling point, a solution with 1 mole of magnesium oxide or 1 mole of sodium oxide?

1 mol Na_2O

Colligative Properties 500

Which has a higher freezing point, a solution of 1 mole of aluminum iodide or 2 moles of beryllium fluoride?

1 mol AlI_3

Acids and Bases 100

What is the hydronium ion?

H_3O^+

Acids and Bases 200

What is self-ionization and show an example with water?

Self-ionization is when a substance breaks into ions with no solvent.

$$H_2O \leftrightarrow H^+ + OH^-$$

Acids and Bases 300

Write a reaction between NH_3 and H_2O. Label the acid, base, conjugate acid, and conjugate base.

$$NH_3 + H_2O \leftrightarrow NH_4^+ + OH^-$$

base acid conj. acid conj. base

Acids and Bases 400

What is monoprotic, diprotic, and triprotic? Give example of each using the **name** and the **formula**.

Monoprotic – $1H^+$ (HCl – hydrochloric acid)
Diprotic – $2H^+$ (H_2SO_4 – sulfuric acid)
Triprotic – $3H^+$ (H_3PO_4 – phosphoric acid)

Acids and Bases 500

What is the difference in the Arrhenius, Bronsted-Lowry, and Lewis definitions for acids and bases?

An Arrhenius acid produces H^+ ions in solution and a base produces OH^- ions in solution.

A Bronsted-Lowry acid is a proton donor and a base is a proton acceptor.

A Lewis acid is an electron pair acceptor and a base is an electron pair donor.

pH Square Problems 100

If pH = 3.77, what is $[H^+]$? (Is the solution acidic, basic, or neutral?)

1.7×10^{-4}M, acidic

pH Square Problems 200

If $[OH^-] = 6.9 \times 10^{-4}$M, what is pOH? (Is the solution acidic, basic, or neutral?)

3.16, basic

pH Square Problems 300

If $[OH^-] = 4.0 \times 10^{-7}M$, what is $[H^+]$? (Is the solution acidic, basic, or neutral?)

$2.5 \times 10^{-8}M$, basic

pH Square Problems 400

If pOH = 3.71, what is $[H^+]$? (Is the solution acidic, basic, or neutral?)

5.13×10^{-11}M, basic

pH Square Problems 500

If $[OH^-] = 0.0001M$, what is pH? (Is the solution acidic, basic, or neutral?)

10.00, basic

K and Titrations 100

What is a buffer and how is it made?

A buffer is a solution that resists a change in pH. A buffer is made from a weak acid and its conjugate base.

K and Titrations 200

What is a strong acid and what are the 3 strong acids listed in your book?

A strong acid fully breaks into ions in a solution.
HCl, H_2SO_4, and HNO_3

K and Titrations 300

What is the molarity of sodium hydroxide if 20.0mL of the solution is neutralized by 28.0mL of 1.00M hydrochloric acid?

1.40M

K and Titrations 400

What is the molarity of sodium hydroxide if 20.0mL of the solution is neutralized by 17.4mL of 1.00M phosphoric acid?

2.61M

K and Titrations 500

In exactly 0.2M solution of a monoprotic weak acid, $[H^+] = 9.86 \times 10^{-4}$M. What is the K_a for the weak acid?

4.89×10^{-6}

Vocabulary	Heat	Thermo-chemical Equations	Heating Curve Problems	Hess' Law	ΔH_f
200	200	200	200	200	200
400	400	400	400	400	400
600	600	600	600	600	600
800	800	800	800	800	800
1000	1000	1000	1000	1000	1000

Vocabulary 200

What is heat?

Heat is a form of energy that flows between objects due to a temperature difference.

Vocabulary 400

What is the difference in an exothermic reaction and an endothermic reaction?

An exothermic reaction releases heat to the surroundings. An endothermic reaction absorbs heat from the surroundings.

Vocabulary 600

Define system, surroundings, and universe

A system is the part of the universe on which you focus your attention.
The surroundings include everything else in the universe that you are not focusing attention on.
The universe includes the system and the surroundings.

Vocabulary 800

What is chemical potential energy?

Energy stored within the bonds of a chemical.

Vocabulary 1000

Define calorie, heat capacity, and specific heat capacity.

Heat capacity is the amount of heat needed to increase the temperature of a substance by 1°C.
Specific heat capacity is the amount of heat needed to increase the temperature of 1g of a substance 1°C.
A calorie is the amount of heat needed to increase the temperature of 1g of water 1°C.

Heat 200

What is the conversion factor between Joules and calories?

1 cal = 4.184 J

Heat 400

Convert 500J to cal.

119.5 cal

Heat 600

Convert 2000 **Cal** to J.

8368000 J

Heat 800

How much heat is released when 27.3g of aluminum is cooled from 200°C to 150°C? (c_{Al} = 0.90 J/g°C)

-1228.5J

Heat 1000

How many moles of silver were heated from 20°C to 250°C if 2.760 kJ of heat were absorbed? (c_{Ag} = 0.24 J/g°C)

0.46 mol Ag

Thermochemical Equations 200

If a reaction is endothermic, then would the heat be listed as a reactant or a product? Would ΔH be positive or negative?

Reactant, positive

Thermochemical Equations 400

How much heat is absorbed when 14.3 mol of sodium hydrogen carbonate decomposes?

$2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

$\Delta H = 129$ kJ

922.35 kJ

Thermochemical Equations 600

How many grams of sulfur reacted if 726 kJ of heat was produced in the following reaction?

$C + 2S \rightarrow CS_2 \quad \Delta H = 89.3\ kJ$

520.3g S

Thermochemical Equations 800

When iron (III) oxide reacts with carbon monoxide to form iron metal and carbon dioxide, 26.3 kJ of heat is released. How much heat is released if 350g of iron is produced?

-82.18 kJ

Thermochemical Equations 1000

When ethanol (C_2H_5OH) combusts, 1368kJ of heat is released. How many liters of oxygen must react to produce 5000kJ of heat.

245.6L O_2

Heating Curve Problems 200

How much heat is absorbed when 100g NH_3 solid melts into a liquid?

ΔH_{fus} = 5.65 kJ/mol

ΔH_{vap} = 23.4 kJ/mol

33.24 kJ

Heating Curve Problems 400

What change of heat occurs when 265g of methanol (CH_3OH) gas condenses to a liquid?

ΔH_{fus} = 3.16 kJ/mol

ΔH_{vap} = 35.3 kJ/mol

-292.33 kJ

Heating Curve Problems 600

Calculate the amount of heat absorbed when 100g of water at 75°C is converted to steam at 120°C.

239971J

Heating Curve Problems 800

Calculate the amount of heat absorbed when 50g of ice at -15°C is converted to steam at 200°C.

160745J

Heating Curve Problems 1000

Draw and label the heating curve for water like I would in class.

Check answers

Hess' Law 200

If you need to reverse a reaction in Hess' law, what happens to the ΔH?

The sign of ΔH changes.

Hess' Law 400

Calculate the change in enthalpy for the following reaction:

$PbCl_2 + Cl_2 \rightarrow PbCl_4$

Use the following data:

$Pb + 2Cl_2 \rightarrow PbCl_4 \Delta H = -329.2kJ$

$Pb + Cl_2 \rightarrow PbCl_2 \Delta H = -359.4kJ$

30.2 kJ

Hess' Law 600

Calculate the change in enthalpy for the following reaction:

$2P + 5Cl_2 \rightarrow 2PCl_5$

Use the following data:

$PCl_5 \rightarrow PCl_3 + Cl_2 \Delta H = 87.9kJ$

$2P + 3Cl_2 \rightarrow 2PCl_3 \Delta H = -574kJ$

-750 kJ

Hess' Law 800

Calculate the enthalpy change for the following reaction:

$N_2 + O_2 \rightarrow 2NO$

Use the following data:

$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$

$\Delta H = -1.53 \times 10^3$ kJ

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

$\Delta H = -1.17 \times 10^3$ kJ

1.8×10^2 kJ

Hess' Law 1000

Calculate the enthalpy change for the following reaction:

$Ca + C + 3/2O_2 \rightarrow CaCO_3$

Use the following data:

$Ca + 2C \rightarrow CaC_2 \Delta H = -62.8$ kJ

$CO_2 \rightarrow C + O_2 \Delta H = 393.5$kJ

$CaCO_3 + CO_2 \rightarrow CaC_2 + 2\ ½O_2$

$\Delta H = 1538$kJ

-1207 kJ

ΔH_f 200

What is the standard heat of formation for an element in its standard state?

0 kJ/mol

ΔH_f 400

What are the standard conditions used for ΔH_f?

25°C and 101.3 kPa

ΔH_f 600

Calculate ΔH_f for the following reaction:

$2C_{(s,graphite)} + O_{2(g)} \rightarrow 2CO_{(g)}$

-221kJ

ΔH_f 800

Calculate the ΔH_f for the following reaction:

$$2H_2O_{2(l)} \rightarrow 2H_2O_{(l)} + O_{2(g)}$$

-196kJ

ΔH_f 1000

Calculate the ΔH_f for the following reaction:

$$4NH_{3(g)} + 5O_{2(g)} \rightarrow 4NO_{(g)} + 6H_2O_{(g)}$$

-905kJ