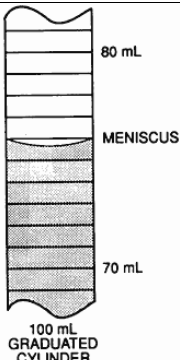


Unit 1: Getting Ready for Chemistry

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 1. I can list five important lab safety rules.</p>	<p>5 important lab safety rules are:</p> <ol style="list-style-type: none">1.2.3.4.5.
<p>___ 2. I can identify the most common laboratory tools such as: beaker, graduated cylinder, Erlenmeyer flask, scoop, beaker tongs, test tube, test tube rack, test tube holder, crucible tongs, Bunsen burner, striker, stirring rod, funnel, dropper pipette (aka eye dropper)</p>	<p>Draw and label as many of the common laboratory tools as you can!</p>
<p>___ 3. I can determine the independent and dependent variable in a lab experiment.</p>	<p>A farmer wants to know what the effect the amount of fertilizer has on the amount of fruit an apple tree produces.</p> <p>What is the independent variable?</p> <p>What is the dependent variable?</p>
<p>___ 4. I can determine the number of significant figures in a measurement.</p>	<p>How many significant figures are there in 30.50 cm?</p> <p>How many significant figures are there in 400 sec?</p>
<p>___ 5. I can determine the answer to a math problem to the correct number of significant figures.</p>	<p>To the correct number of significant figures, what is the answer to $5.93 \text{ mL} + 4.6 \text{ mL}$?</p> <p>To the correct number of significant figures, what is the answer to $5.93 \text{ mL} * 4.6 \text{ mL}$?</p>

<p>___ 6. I can read the meniscus on a graduated cylinder to the correct number of significant figures.</p>	 <p>The volume is _____ mL.</p>
<p>___ 7. I can use dimensional analysis to solve math problems.</p>	<p>To the correct number of significant figures, determine how many meters there are in 15.4 ft.</p> <p>To the correct number of significant figures, determine how many minutes there are in 2.7 years.</p>
<p>___ 8. I can convert numbers into scientific notation from standard notation.</p>	<p>Convert 87,394,000,000,000 to scientific notation.</p> <p>Convert 0.0000040934 to scientific notation.</p>
<p>___ 9. I can convert numbers into standard notation from scientific notation.</p>	<p>Convert 5.8×10^9 to standard notation.</p> <p>Convert 4.3×10^{-5} to standard notation.</p>
<p>___ 10. I can use my calculator to input numbers in scientific notation using the "2nd" function & EE keys.</p>	<p>Enter the number 5.67×10^{52} on your calculator and show Mrs. S. She'll initial this box, if you've done it correctly!</p>
<p>___ 11. I can convert between different metric units by using "King Henry died by drinking chocolate milk".</p>	<p>9.3 km = ? m</p> <p>39,983 mL = ?kL</p>
<p>___ 12. I can convert between different metric units by using Reference Table C and dimensional analysis.</p>	<p>1.5×10^{-3} km = ? mm</p> <p>4.67×10^{13} pm = ?dm</p>

<p>___13. I can determine which equation to use from Reference Table T by looking at the given information.</p>	<p>Which equation would you use to solve the following problem? (Don't solve it. Just tell me WHICH equation to use.)</p> <p><i>Problem:</i> How many grams of LiBr (gram-formula mass = 87 g/mol) would 3.5 moles of LiBr be?</p>
<p>___14. I can solve for "x" when it's in the denominator of a fraction.</p>	<p>What is the volume, in cm^3, of 54.6 g of beryllium (density = 1.85 g/cm^3)</p>
<p>___15. I can convert $^{\circ}\text{C}$ to degrees kelvin and degrees kelvin to $^{\circ}\text{C}$.</p>	<p>What kelvin temperature is equal to 200°C?</p> <p>What Celsius temperature is equal to 200K?</p>
<p>___16. Given the symbol I can write the name for any element in Group 1, Group 2, Group 13, Group 14, Group 15, Group 16, Group 17 or Group 18 without using a Periodic Table.</p>	<p>Al_____</p> <p>Ca_____</p> <p>Ne_____</p> <p>N_____</p> <p>Na_____</p> <p>S_____</p> <p>Br_____</p> <p>Ge_____</p>
<p>___17. Given the symbol or the name, I can determine the Group for any element in Group 1, Group 2, Group 13, Group 14, Group 15, Group 16, Group 17 or Group 18 without using a Periodic Table.</p>	<p>Al_____</p> <p>Ca_____</p> <p>Ne_____</p> <p>N_____</p> <p>Na_____</p> <p>S_____</p> <p>Br_____</p> <p>Ge_____</p>
<p>___18. I can define gram-formula mass (AKA molar mass).</p>	<p>Definition:</p>

<p>___ 19. Given the chemical symbol/formula, I can determine how many atoms are present.</p>	<p>How many atoms are in N_2?</p> <p>What is the total # of atoms in $Pb(C_2H_3O_2)_2$?</p> <p>How many atoms of C are in $Pb(C_2H_3O_2)_2$?</p>
<p>___ 20. I can determine the gram-formula mass for any element or compound.</p>	<p>What is the gfm for N_2?</p> <p>What is the gfm for $Pb(C_2H_3O_2)_2$?</p>
<p>___ 21. I can define a mole as it pertains to chemistry.</p>	<p>Definition:</p>
<p>___ 22. I can find the number of moles of substance if I am given the mass and formula for the substance.</p>	<p>94.3 g is how many moles of NaCl?</p>
<p>___ 23. I can determine the percent composition of an element in a compound.</p>	<p>What is the percent by mass of Mg in $Mg(NO_3)_2$?</p>
<p>___ 24. I can convert between moles and numbers of particles using Avogadro's number?</p>	<p>How many moles are there in 4.8×10^{24} of C?</p>
<p>___ 25. I can convert between moles and L (assuming STP).</p>	<p>How many L does 4.6 moles of O_2 occupy?</p>

Unit 2: Introduction to Matter

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___2. I can define the following: atom, element, compound, mixture</p>	<p>Definitions: atom</p> <p>element</p> <p>compound</p> <p>mixture</p>	
<p>___3. I can draw particle diagrams to represent an atom, an element, a molecule, a compound, a mixture</p>	<p>Atom</p>	<p>Element</p>
	<p>Molecule</p>	<p>Compound</p>
	<p>Mixture of 2 compounds</p>	<p>Mixture of an element and a compound</p>

<p>___ 4. I can classify substances as a pure substance (element or compound) or as a mixture.</p>	<p>Put each of the following examples into the correct column.</p> <p>Examples: $C_{12}H_{22}O_{11}$, NaCl, Fe, salt water, air, CO_2, H_2, Ar, soda</p>		
	<p><u>Element</u></p>	<p><u>Compound</u></p>	<p><u>Mixture</u></p>
<p>___ 5. I can define homogeneous mixture and heterogeneous mixture in terms of particle distribution.</p>	<p>Definitions: homogeneous mixture</p> <p>heterogeneous mixture</p>		
<p>___ 6. I can give an example of homogeneous and heterogeneous mixtures.</p>	<p>Two examples of homogeneous mixtures:</p> <p>a.</p> <p>b.</p> <p>Two examples of heterogeneous mixtures:</p> <p>a.</p> <p>b.</p>		
<p>___ 7. I can classify a property as physical or chemical.</p>	<p>Write "P" for physical or "C" for chemical on the line provided.</p> <p>___ copper (II) sulfate is blue.</p> <p>___ copper reacts with oxygen.</p> <p>___ copper can be made into wire.</p> <p>___ copper has a density of 8.96 g/cm^3.</p> <p>___ copper melts at 1358K.</p> <p>___ copper reacts with nitric acid.</p> <p>___ copper doesn't dissolve in water.</p>		

<p>___ 8. I can classify a change as physical or chemical.</p>	<p>Write "P" for physical or "C" for chemical on the line provided.</p> <p>___ copper (II) sulfate dissolves in water.</p> <p>___ copper reacts with oxygen to form solid copper (I) oxide.</p> <p>___ solid copper is melted.</p> <p>___ a chunk of copper is pounded flat.</p> <p>___ copper and zinc are mixed to form brass.</p> <p>___ a large piece of copper is chopped in half.</p> <p>___ copper reacts with bromine to form copper (II) bromide.</p>
<p>___ 9. In a particle diagram, I can distinguish between a physical change and a chemical change.</p>	<div data-bbox="586 642 740 800" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> </div> <p style="text-align: center;">Substance A</p> <p>Circle the particle diagram that best represents Substance A after a physical change has occurred.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> </div> </div>
<p>___ 10. I can define: solute, solvent, solution, and solubility.</p>	<p>Definitions:</p> <p>solute</p> <p>solvent</p> <p>solution</p> <p>solubility</p>
<p>___ 11. I can describe the trend in solubility for solids as the temperature changes.</p>	<p>As the temperature increases, the solubility of a solid _____.</p>

<p>___ 12. I can describe the trend in solubility for gases as the temperature changes.</p>	<p>As the temperature increases, the solubility of a gas _____.</p>
<p>___ 13. I can use Reference Table F to determine if a substance will be soluble in water.</p>	<p>Write "S" for soluble and "NS" for not soluble. Use Reference Table F to determine the solubility of the following compounds:</p> <p>___ potassium chlorate</p> <p>___ silver bromide</p> <p>___ lithium carbonate</p> <p>___ calcium carbonate</p>
<p>___ 14. I can use Table G to determine how much solute to add at a given temperature to make a saturated solution.</p>	<p>How many grams of KClO_3 must be dissolved in 100 grams of water at 20°C to make a saturated solution?</p>
<p>___ 15. I can use Table G to determine if a solution is saturated, unsaturated, or supersaturated.</p>	<p>If 20.0 g of NaNO_3 are dissolved in 100.0 g of water at 25.0°C, will the resulting solution be saturated, unsaturated, or supersaturated?</p>
<p>___ 16. I can define: dilute, concentrated, concentration, and electrolyte.</p>	<p>Definitions:</p> <p>dilute</p> <p>concentrated</p> <p>concentration</p> <p>electrolyte</p>
<p>___ 17. I can interpret Table G to determine which solution is the most concentrated or the most dilute.</p>	<p>Which solution is most concentrated?</p> <p>A) 125.0 g of KI dissolved in 100.0 g of water at 10°C</p> <p>B) 70.0 g of NH_4Cl dissolved in 100.0 g of water at 70°C</p> <p>C) 120.0 g of KNO_3 dissolved in 100.0 g of water at 70°C</p> <p>D) 30.0 g of SO_2 dissolved in 100.0 g of water at 90°C</p>
<p>___ 18. I can use Reference Table T to calculate the concentration of a solution in ppm.</p>	<p>What is the concentration, in ppm, of a 2600 g of solution containing 0.015 g of CO_2?</p>
<p>___ 19. I can use Reference Table T to calculate the concentration of a solution in molarity.</p>	<p>What is the molarity of 3.5 moles of NaBr dissolved in 500 mL of water?</p>

<p>___20. I can determine how matter will be separated using filtration.</p>	<p>When a mixture of sand, salt, sugar, and water is filtered, what passes through the filter?</p>
<p>___21. I can describe how matter can be separated using distillation.</p>	<p>Which physical property makes it possible to separate the components of crude oil by means of distillation?</p>
<p>___23. I can state which separation process (decanting, filtering, distilling, chromatography, or evaporating) is best for a given situation.</p>	<p>To separate a mixture of salt and water, the best method of separation would be_____.</p> <p>To separate a mixture of ethanol and water, the best method of separation would be _____.</p> <p>To separate a mixture of food coloring dyes, the best method of separation would be _____.</p> <p>To separate a mixture of oil and water, the best method of separation would be_____.</p>
<p>___24. I can define allotrope.</p>	<p>Defintion: allotrope</p>
<p>___25. I can state the differences between two allotropes of the same element.</p>	<p>Two allotropes of the same element have different molecular structures and therefore have different _____ and _____ properties.</p>

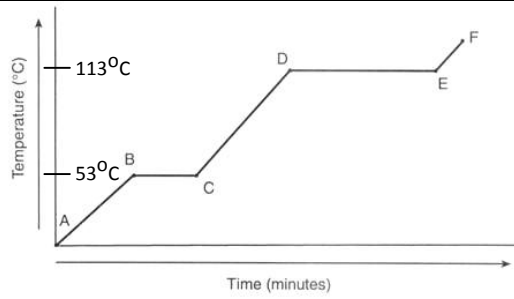
Unit 3: Matter & Energy

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 3. I can define kinetic energy, potential energy, temperature, heat, endothermic, and exothermic.</p>	<p>Defintions: kinetic energy</p> <p>potential energy</p> <p>temperature</p> <p>heat</p> <p>endothermic</p> <p>exothermic</p>						
<p>___ 4. I can use particle diagrams to show the arrangement and spacing of atoms/molecules in different phases.</p>	<p>Draw a particle diagram to represent atoms of Li in each phase.</p> <table border="1" data-bbox="553 1209 1489 1463"><thead><tr><th data-bbox="553 1209 865 1251">Solid</th><th data-bbox="865 1209 1177 1251">Liquid</th><th data-bbox="1177 1209 1489 1251">Gas</th></tr></thead><tbody><tr><td data-bbox="553 1251 865 1463"></td><td data-bbox="865 1251 1177 1463"></td><td data-bbox="1177 1251 1489 1463"></td></tr></tbody></table>	Solid	Liquid	Gas			
Solid	Liquid	Gas					

<p>___ 5. I can compare solids, liquids, and gases in terms of their relative kinetic energy, type of molecular motion, ability to completely fill a container, ability to change shape.</p>		Solid	Liquid	Gas
	Relative Kinetic Energy			
	Type of Molecular Motion	vibrations, only	vibration and rotation	vibration, rotation, and translation
	Ability to Completely Fill a Container			
	Ability to Change Shape			
<p>___ 6. I can state the change of phase occurring in fusion, solidification, condensation, vaporization, melting, boiling, sublimation, deposition, and freezing.</p>	<p>During fusion a substance changes from _____ to _____.</p> <p>During solidification a substance changes from _____ to _____.</p> <p>During condensation a substance changes from _____ to _____.</p> <p>During vaporization a substance changes from _____ to _____.</p> <p>During melting a substance changes from _____ to _____.</p> <p>During boiling a substance changes from _____ to _____.</p> <p>During sublimation a substance changes from _____ to _____.</p> <p>During deposition a substance changes from _____ to _____.</p> <p>During freezing a substance changes from _____ to _____.</p>			
<p>___ 7. I can indicate if a phase change is exothermic or endothermic.</p>	<p>For each phase change listed, indicate whether the change is exothermic or endothermic.</p> <p>fusion/melting_____</p> <p>solidification/freezing_____</p> <p>condensation_____</p> <p>vaporization/boiling_____</p> <p>sublimation_____</p> <p>deposition_____</p>			

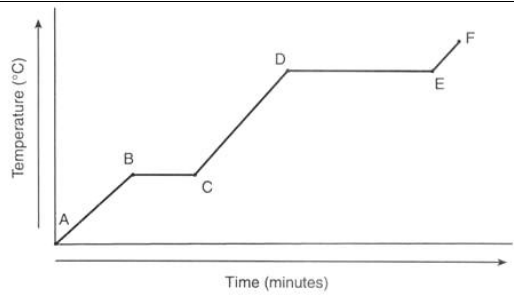
___8. Given a heating/cooling curve, I can determine the temperature at which a substance freezes/melts or condenses/vaporizes.



What is the freezing point of this substance?

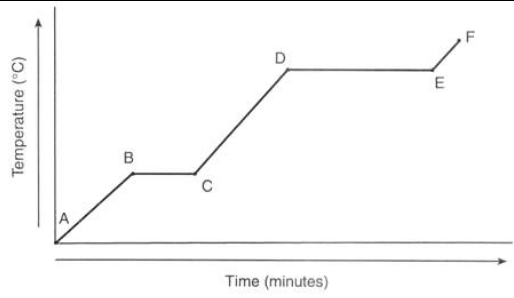
What is the boiling point of this substance?

___9. Given a heating/cooling curve, I can determine which sections of the curve show changes in potential energy.



On the graph, circle the sections that show a change in potential energy.

___10. Given a heating/cooling curve, I can determine which sections of the curve show changes in kinetic energy.



On the graph, circle the sections that show a change in kinetic energy.

___11. I can state the temperature at which water freezes in °C and K.

What is the freezing point of water in °C and K?

___12. I can state the temperature at which water melts in °C and K.

What is the melting point of water in °C and K?

___13. I can state the temperature at which water vaporizes/boils in °C and K.

What is the boiling point of water in °C and K?

___14. I can state the temperature at which water condenses in °C and K.

What is the condensing point of water in °C and K?

<p>____ 15. I can use Reference Table T to determine which “heat” equation is needed for a given problem.</p>	<p>Which heat equation should be used in each of the following:</p> <p>a. How much heat is needed to vaporize 100.0 g of water at 100°C?</p> <p>b. How much heat is needed to raise the temperature of 100.0 g of water by 35°C?</p> <p>c. How much heat is needed to melt 100.0 g of ice at 0°C?</p>
<p>____ 16. I can define specific heat capacity, heat of fusion, heat of vaporization.</p>	<p>Definitions:</p> <p>specific heat capacity</p> <p>heat of fusion</p> <p>heat of vaporization</p>
<p>____ 17. I can use the “heat” equations to solve for any variable, if I am given the other variables.</p>	<p>How many grams of water can be heated by 15°C using 13,500 J of heat?</p> <p>It takes 5210 J of heat to melt 50.0 g of ethanol at its melting point. What is the heat of fusion of ethanol?</p>
<p>____ 18. I can state the 5 parts of the Kinetic Molecular Theory.</p>	<p>The five parts of the Kinetic Molecular Theory are:</p> <p>a.</p> <p>b.</p> <p>c.</p> <p>d.</p> <p>e.</p>

___ 19. I can define an ideal gas.	Definition: ideal gas
___ 20. I can state the conditions of pressure and temperature under which a gas will act "ideally".	A gas will act most "ideally" under the conditions of _____ pressure and _____ temperature.
___ 21. I can state the two elements that act ideally most of the time.	The two elements that act ideally most of the time are _____ & _____.
___ 22. I can explain how pressure is created by a gas.	What causes gas molecules to create pressure?
___ 23. I can state the relationship between pressure and volume for gases (assuming constant temperature).	At constant temperature, as the pressure on a gas increases, the volume _____.
___ 24. I can state the relationship between temperature and volume for gases (assuming constant pressure).	At constant pressure, as the temperature on a gas increases, the volume _____.
___ 25. I can state the relationship between temperature and pressure for gases (assuming constant volume).	In a fixed container (AKA "has constant volume), as the temperature on a gas increases, the pressure _____.
___ 26. I can state Avogadro's Hypothesis.	Avogadro's Hypothesis says _____
___ 27. I can remember to convert °C to K when using the Combined Gas Law to determine changes in V, P, or T of a gas.	A gas originally occupies 2.3L at 56°C and 101.3 kPa. What will its volume be at 100°C and 105.7 kPa?

___ 28. I can define boiling point and vapor pressure.	Definition: boiling point vapor pressure
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<p>____ 29. I can state the conditions of temperature and pressure that are used for "normal" boiling points.</p>	<p>The normal boiling point of a substance occurs at temperature of _____oC/_____K and a pressure of _____atm/_____kPa. This combination of temperature and pressure is abbreviated as _____ and can be found on Reference Table _____.</p>
<p>____ 30. I can state the relationship between atmospheric pressure and boiling point.</p>	<p>As the atmospheric pressure increases, the boiling point _____.</p>

Unit 4: Atomic Theory

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 4. I can describe John Dalton's contribution to our understanding of the atom.</p>	<p>Dalton's Model:</p> <p>What it looked like:</p>
<p>___ 5. I can describe JJ Thomson's contribution to our understanding of the atom.</p>	<p>Thomson's Experiment:</p> <p>Thomson's Model:</p> <p>What it looked like:</p>
<p>___ 6. I can describe Ernest Rutherford's contribution to our understanding of the atom.</p>	<p>Rutherford's Experiment:</p> <p>Rutherford's Model:</p> <p>What it looked like:</p>
<p>___ 7. I can describe Niels Bohr's contribution to our understanding of the atom.</p>	<p>Bohr's Model:</p> <p>What it looked like:</p>
<p>___ 8. I can describe James Chadwick's contribution to our understanding of the atom.</p>	<p>What subatomic particle did Chadwick discover?</p>
<p>___ 9. I can describe how Schrodinger, Heisenberg, Pauli, Dirac, and others contributed to our understanding of the atom.</p>	<p>What does the modern model of the atom look like?</p> <p>Where, in an atom, are electrons likely to be found according to the modern model?</p>

<p>___ 10. I can state the chronological order of atomic models.</p>	<p>From oldest to newest, list the models that we have used to describe an atom.</p>
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<p>___ 11. I can state the three subatomic particles, their location in an atom, their charges, and their masses (in amu).</p>		<p>Particle #1</p>	<p>Particle #2</p>	<p>Particle #3</p>
	<p>Name</p>			
	<p>Charge</p>			
	<p>Mass</p>			
	<p>Location in Atom</p>			

<p>___ 12. I can explain why atoms are electrically neutral.</p>	<p>Atoms are electrically neutral because the number of _____ is equal to the number of _____.</p>
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<p>___ 13. I can define mass number and atomic number.</p>	<p>Definitions: mass number atomic number</p>
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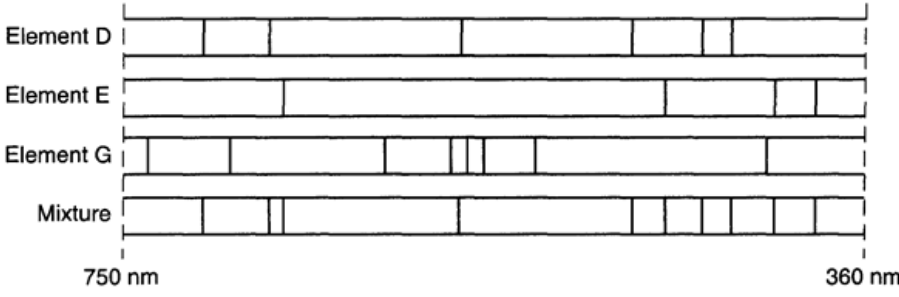
<p>___ 14. Given the mass number, I can determine the number of protons, neutron, and electrons in an atom.</p>	<p>In an atom of ^{212}Po, how many protons are present? 84</p> <p>In an atom of ^{212}Po, how many electrons are present? 84</p> <p>In an atom of ^{212}Po, how many neutrons are present? 84</p>
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<p>___ 15. I can use the Periodic Table to determine the atomic number of an element.</p>	<p>How many protons are in an atom of selenium? How many protons are in an atom of silicon?</p>
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<p>___ 16. I can define isotope.</p>	<p>Definition: isotope</p>
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<p>___17. I can represent an atom in any of the four methods of isotopic notation.</p>	<p>Write the four different methods of isotopic notation for an atom of bromine that has 45 neutrons.</p> <p>Method 1 Method 2 Method 3 Method 4</p>
<p>___18. I can calculate average atomic mass given the masses of the naturally occurring isotopes and the percent abundances.</p>	<p>Element Q has two isotopes. If 77% of the element has an isotopic mass of 83.7 amu and 23% of the element has an isotopic mass of 89.3 amu, what is the average atomic mass of the element?</p>
<p>___19. I can define ion, cation, and anion.</p>	<p>Definitions:</p> <p>ion</p> <p>cation</p> <p>anion</p>
<p>___20. Given the mass number and the charge, I can determine the number of protons, neutrons, and electrons in an ion.</p>	<p>How many protons are in $^{19}\text{F}^{1-}$? 10</p> <p>How many neutrons are in $^{19}\text{F}^{1-}$? 10</p> <p>How many electrons are in $^{19}\text{F}^{1-}$? 10</p>

<p>___21. I can define principal energy level, orbital, ground state, excited state, electron configuration, and bright line spectrum.</p>	<p>Definitions:</p> <p>principal energy level</p> <p>orbital</p> <p>ground state</p>
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	<p>excited state</p> <p>electron configuration</p> <p>bright line spectrum</p>
<p>___22. I can state the maximum number of electrons that will fit into each of the first four principal energy levels.</p>	<p>PEL1 holds a maximum of _____ electrons.</p> <p>PEL2 holds a maximum of _____ electrons.</p> <p>PEL3 holds a maximum of _____ electrons.</p> <p>PEL4 holds a maximum of _____ electrons.</p>
<p>___23. I can state the relationship between distance from the nucleus and energy of an electron.</p>	<p>As the distance between the nucleus and the electron increases, the energy of the electron _____.</p>
<p>___24. I can state the relationship between the number of the principal energy level and the distance to the atom's nucleus.</p>	<p>As the number of the PEL increases, the distance to the nucleus _____.</p>
<p>___25. I can explain, in terms of subatomic particles and energy states, how a bright line spectrum is created.</p>	<p>A brightline spectrum is created when</p>
<p>___26. I can identify the elements shown in a bright line spectrum.</p>	<p style="text-align: center;">Bright-Line Spectra</p>  <p>Which element(s) is/are present in the mixture?</p>

<p>___27. I can define valence electrons.</p>	<p>Definition: valence electron</p>
<p>___28. I can locate and interpret an element's electron configuration on the Periodic Table.</p>	<p>How many valence electrons does an atom of rubidium have in the ground state?</p> <p>How many principal energy levels contain electrons in an atom of iodine in the ground state?</p>
<p>___29. I can identify an electron configuration that shows an atom in the excited state.</p>	<p>Which electron configuration represents an atom of potassium in the excited state?</p> <p>A) 2-8-7-1 B) 2-8-8-1 C) 2-8-7-2 D) 2-8-8-2</p>
<p>___30. I can draw Lewis electron dot diagrams for a given element.</p>	<p>Draw the Lewis electron dot diagram for the following atoms:</p> <p>Li Be B C N O F Ne</p>
<p>___31. I can define and state the importance of "octet of valence electrons."</p>	<p>Definition: octet of valence electrons</p> <p>The importance of having a complete "octet of valence electrons" is</p>

Unit 5: Nuclear Chemistry

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 5. I can compare types of radiation in terms of symbol, mass number, charge, penetrating power, shielding required, and biological hazard.</p>	Type	Symbol	Mass #	Charge	Penetrating Power	Shielding Required	Bio Hazard
	alpha						
	beta						
	gamma						
	neutron						
	positron						
<p>___ 6. I can identify the three types of nuclear reactions.</p>	<p>The three types of nuclear reactions are:</p> <p>a.</p> <p>b.</p> <p>c.</p>						
<p>___ 7. I can define transmutation, fission, and fusion.</p>	<p>Definitions:</p> <p>transmutation</p> <p>fission</p> <p>fusion</p>						
<p>___ 8. I can state two synonyms for spontaneous decay.</p>	<p>Two synonyms for spontaneous decay are: _____ and _____.</p>						
<p>___ 9. I can show how mass number and electrical charge must be conserved in any nuclear reaction.</p>	<p>Complete the following nuclear equation:</p> ${}_{19}^{42}\text{K} \rightarrow {}_{20}^{42}\text{Ca} + \underline{\hspace{2cm}}$						
<p>___ 10. I can explain what makes a nucleus stable or unstable.</p>	<p>The stability of the nucleus is dependent on the _____ to _____ ratio.</p>						
<p>___ 11. I can explain the difference between natural</p>							

transmutation and artificial transmutation.	The difference between natural transmutation and artificial transmutation is that in natural transmutation an _____ breaks apart on its own and in artificial transmutation a _____ is made _____ by hitting it with a high energy particle (such as a proton, neutron, or gamma radiation).
___ 12. I can identify a natural decay reaction from a list of reactions.	Which equation represents a natural decay? A) ${}^9_4\text{Be} + {}^1_1\text{H} \rightarrow {}^6_3\text{Li} + {}^4_2\text{He}$ B) ${}^{27}_{13}\text{Al} + {}^4_2\text{He} \rightarrow {}^{30}_{15}\text{P} + {}^1_0\text{n}$ C) ${}^{14}_7\text{N} + {}^4_2\text{He} \rightarrow {}^{17}_8\text{O} + {}^1_1\text{H}$ D) ${}^{235}_{92}\text{U} \rightarrow {}^{231}_{90}\text{Th} + {}^4_2\text{He}$
___ 13. I can identify an artificial transmutation reaction from a list of reactions.	Which equation represents artificial transmutation? A) ${}^{16}_7\text{N} \rightarrow {}^{16}_8\text{O} + {}^0_{-1}\text{e}$ B) ${}^{14}_7\text{N} + {}^4_2\text{He} \rightarrow {}^{17}_8\text{O} + {}^1_1\text{H}$ C) ${}^{37}_{19}\text{K} \rightarrow {}^{37}_{18}\text{Ar} + {}^0_{+1}\text{e}$ D) ${}^{42}_{19}\text{K} \rightarrow {}^{42}_{20}\text{Ca} + {}^0_{+1}\text{e}$
___ 14. I can identify a fission reaction from a list of reactions.	Which equation represents fission? A) ${}^1_0\text{n} + {}^{235}_{92}\text{U} \rightarrow {}^{142}_{56}\text{Ba} + {}^{91}_{36}\text{Kr} + 3{}^1_0\text{n}$ B) ${}^{226}_{88}\text{Ra} \rightarrow {}^{222}_{86}\text{Rn} + {}^4_2\text{He}$ C) ${}^6_3\text{Li} + {}^1_0\text{n} \rightarrow {}^3_1\text{H} + {}^4_2\text{He}$ D) ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n}$
___ 15. I can identify a fusion reaction from a list of reactions.	Which equation represents fusion? A) ${}^1_0\text{n} + {}^{235}_{92}\text{U} \rightarrow {}^{142}_{56}\text{Ba} + {}^{91}_{36}\text{Kr} + 3{}^1_0\text{n}$ B) ${}^{226}_{88}\text{Ra} \rightarrow {}^{222}_{86}\text{Rn} + {}^4_2\text{He}$ C) ${}^6_3\text{Li} + {}^1_0\text{n} \rightarrow {}^3_1\text{H} + {}^4_2\text{He}$ D) ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n}$

<p>___16. I can state the conditions of temperature and pressure that are needed for a fusion reaction to happen.</p>	<p>The temperature and pressure conditions needed for fusion to happen are: _____ temperature and _____ pressure</p>
<p>___17. I can explain why all nuclear reactions release LOTS more energy than chemical reactions do.</p>	<p>Nuclear reactions release LOTS more energy than chemical reactions do because</p>
<p>___18. Given a list of reactions, I can differentiate a "nuclear" reaction from a "chemical" reaction.</p>	<p>Which of the following equations represent NUCLEAR reactions?</p> <p>A) $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2\text{O}(\ell)$ B) $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$ C) ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n}$ D) ${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{142}_{56}\text{Ba} + {}^{91}_{36}\text{Kr} + 3 {}^1_0\text{n}$</p>
<p>___19. I can define half-life.</p>	<p>Definition: half-life</p>
<p>___20. Given the length of the half-life and the amount of time that has passed, I can determine the amount of radioactive sample.</p>	<p>Based on Reference Table N, what fraction of a radioactive sample of Au-198 will remain unchanged after 10.78 days?</p> <p>What was the original mass of a radioactive sample of K-37 if the sample decayed to 25.0 g after 4.92 seconds? The half-life of K-37 is 1.23 seconds)</p>
<p>___21. Given the length of the half-life and the amount of radioactive sample, I can determine the amount of time that has passed.</p>	<p>A 100.0 g sample of Co-60 decays until only 12.5 g of it remains. Given that the half-life of Co-60 is 5.271 years, how long did the decay take?</p>
<p>___22. Given the amount of time that has passed and the amount of radioactive sample, I can determine the length of the half-life.</p>	<p>What is the half-life of a radioisotope if 25.0 g of an original 200.0 g sample remains unchanged after 11.46 days?</p>
<p>___23. Using Table N, I can determine the length of half-life and/or decay mode for a specific radioactive isotope.</p>	<p>Compared to K-37, the isotope K-42 has</p> <p>A) shorter half-life and the same decay mode B) shorter half-life and a different decay mode C) longer half-life and the same decay mode D) longer half-life and a different decay mode</p>

<p>____ 24. I can state 5 beneficial uses for radioactive isotopes.</p>	<p>Five beneficial uses for radioactive isotopes are:</p> <ul style="list-style-type: none">a.b.c.d.e.
<p>____ 25. I can state the scientific use of 4 specific radioactive isotopes.</p>	<p>C-14 is used for _____</p> <p>I-131 is used for _____</p> <p>U-238 is used for _____</p> <p>Co-60 is used for _____</p>
<p>____ 26. I can state three risks associated with radioactivity and radioactive isotopes.</p>	<p>Three risks associated with radioactivity and radioactive isotopes are:</p> <ul style="list-style-type: none">a.b.c.

Unit 6: Periodic Table

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___6. I can classify elements as metals, nonmetals, or metalloids based on their placement on the Periodic Table.</p>	<p>Classify each of the following elements as metals (M), nonmetals (NM), or metalloids (MTLD).</p> <p>___B ___K ___Li ___C ___Ar</p> <p>___Sb ___H ___Fe ___Au ___S</p> <p>___F ___Si ___Fr ___He ___Rn</p> <p>___Ge ___Al ___As ___Bi ___I</p>
<p>___7. I can state the group names for elements in groups 1, 2, 17, and 18.</p>	<p>Group 1 is called the _____.</p> <p>Group 2 is called the _____.</p> <p>Group 17 is called the _____.</p> <p>Group 18 is called the _____.</p>
<p>___8. I can explain why elements in the same group have similar chemical properties.</p>	<p>Elements in the same group have similar chemical properties because</p>
<p>___9. I can explain why the elements in Group 18 don't usually react with other elements.</p>	<p>Elements in Group 18 don't usually react with other elements because</p>
<p>___10. I can state the meaning of "STP" and the Reference Table on which it can be found.</p>	<p>STP stands for _____.</p> <p>The values can be found on Reference Table _____.</p>
<p>___11. I can state the names/symbols for the two elements on the Periodic Table that are liquids at STP.</p>	<p>The two elements that are liquids at STP are:</p> <p>_____ and _____</p>

<p>___ 12. I can state the names/symbols of the 11 elements that are gases at STP.</p>	<p>The 11 elements that are gases at STP are:</p> <p>_____ / _____ /</p> <p>_____ / _____ /</p> <p>_____ / _____ /</p> <p>_____ / _____ /</p> <p>_____ / _____ /</p> <p>_____ / _____ /</p> <p>and _____</p>
<p>___ 13. I can state how the elements on the Periodic Table are arranged.</p>	<p>The elements on the Periodic Table are arranged by increasing _____.</p>
<p>___ 14. I can list the 7 diatomic elements.</p>	<p>The seven diatomic elements are:</p>
<p>___ 15. I can define electronegativity, first ionization energy, atomic radius, ionic radius, metallic character, and activity/reactivity.</p>	<p>Definitions:</p> <p>electronegativity</p> <p>first ionization energy</p> <p>atomic radius</p> <p>ionic radius</p> <p>metallic character</p> <p>activity/reactivity</p>

<p>___ 16. I can state the periodic trend for electronegativity and explain why it occurs.</p>	<p>As one reads down a group from top to bottom, electronegativity _____ because _____.</p> <p>As one reads across a period from left to right, electronegativity _____ because _____.</p>
<p>___ 17. I can state the periodic trend for first ionization energy and explain why it occurs.</p>	<p>As one reads down a group from top to bottom, first ionization energy _____ because _____.</p> <p>As one reads across a period from left to right, first ionization energy _____ because _____.</p>
<p>___ 18. I can state the periodic trend for atomic radius and explain why it occurs.</p>	<p>As one reads down a group from top to bottom, atomic radius _____ because _____.</p> <p>As one reads across a period from left to right, atomic radius _____ because _____.</p>
<p>___ 19. I can state the periodic trend for metallic character and explain why it occurs.</p>	<p>As one reads down a group from top to bottom, metallic character _____ because _____.</p> <p>As one reads across a period from left to right, metallic character _____ because _____.</p>
<p>___ 20. I can state the trend for melting points and boiling point for METALS as one reads down a group.</p>	<p>As one reads down a group from top to bottom, the melting points and boiling points for METALS _____.</p>
<p>___ 21. I can state the trend for melting points and boiling point for NONMETALS as one reads down a group.</p>	<p>As one reads down a group from top to bottom, the melting points and boiling points for NONMETALS _____.</p>

<p>___ 22. I can state the trend for activity/reactivity for METALS as one reads down a group.</p>	<p>As one reads down a group from top to bottom, the activity/reactivity of METALS _____.</p>										
<p>___ 23. I can state the trend for activity/reactivity for NONMETALS as one reads down a group.</p>	<p>As one reads down a group from top to bottom, the activity/reactivity of NONMETALS _____.</p>										
<p>___ 24. I can explain how loss or gaining of electrons affects the radius of an element.</p>	<p>Metals tend to lose electrons (get oxidized). This loss of electrons causes cations to be _____ than the original atom.</p> <p>Nonmetals tend to gain electrons (get reduced). This gain of electrons causes anions to be _____ than the original atom.</p>										
<p>___ 25. I can list 10 properties of metals.</p>	<p>Ten properties of metals are:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">a.</td> <td style="width: 50%;">b.</td> </tr> <tr> <td>c.</td> <td>d.</td> </tr> <tr> <td>e.</td> <td>f.</td> </tr> <tr> <td>g.</td> <td>h.</td> </tr> <tr> <td>i.</td> <td>j.</td> </tr> </table>	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.
a.	b.										
c.	d.										
e.	f.										
g.	h.										
i.	j.										
<p>___ 26. I can list 8 properties of nonmetals.</p>	<p>Eight properties of non metals are:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">a.</td> <td style="width: 50%;">b.</td> </tr> <tr> <td>c.</td> <td>d.</td> </tr> <tr> <td>e.</td> <td>f.</td> </tr> <tr> <td>g.</td> <td>h.</td> </tr> </table>	a.	b.	c.	d.	e.	f.	g.	h.		
a.	b.										
c.	d.										
e.	f.										
g.	h.										

Unit 7: Acids & Bases

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___7. I can use two different systems to define acids and bases.</p>		Arrhenius	“Alternate Method” (AKA Bronsted-Lowry)
	acid		
	base		
<p>___8. I can define pH, [], hydronium ion, hydroxide ion, and electrolyte.</p>	<p>Definitions: pH [] hydronium ion hydroxide ion electrolyte</p>		

<p>___9. I can state another name for the hydronium ion.</p>	<p>The hydronium ion is also known as the _____.</p>
<p>___10. Given the hydronium ion concentration, I can determine the pH.</p>	<p>If the $[H_3O^+]$ is 1×10^{-8}, the pH of the solution will be_____.</p> <p>If the $[H_3O^+]$ is 1×10^{-1}, the pH of the solution will be_____.</p> <p>If the $[H_3O^+]$ is 1×10^{-14}, the pH of the solution will be_____.</p> <p>If the $[H_3O^+]$ is 1×10^{-7}, the pH of the solution will be_____.</p>

<p>___ 11. Based on pH, I can determine if a solution is acidic, basic, or neutral.</p>	<p>If the pH of a solution is 4.5, the solution is _____.</p> <p>If the pH of a solution is 7.0, the solution is _____.</p> <p>If the pH of a solution is 11, the solution is _____.</p> <p>If the pH of a solution is 5.7, the solution is _____.</p>								
<p>___ 13. I can state the relationship between H⁺ concentration and pH.</p>	<p>As the H⁺ concentration decreases, the pH _____.</p> <p>As the H⁺ concentration increases, the pH _____.</p>								
<p>___ 14. I can determine the change in pH when the H⁺ concentration of a solution is changed.</p>	<p>If the H⁺ concentration is increased by a factor of 10, the pH will decrease by _____.</p> <p>-----</p> <p>If the H⁺ concentration is increased by a factor of 100, the pH will decrease by _____.</p> <p>-----</p> <p>If the H⁺ concentration is decreased by a factor of 1000, the pH will increase by _____.</p> <p>-----</p>								
<p>___ 15. I can give examples of the chemical names of common acids and bases.</p>	<p>List the chemical names of three common acids and three common bases.</p> <table border="1" data-bbox="553 1024 1492 1289"> <thead> <tr> <th data-bbox="553 1024 1024 1062">Acids</th> <th data-bbox="1024 1024 1492 1062">Bases</th> </tr> </thead> <tbody> <tr> <td data-bbox="553 1062 1024 1140"></td> <td data-bbox="1024 1062 1492 1140"></td> </tr> <tr> <td data-bbox="553 1140 1024 1218"></td> <td data-bbox="1024 1140 1492 1218"></td> </tr> <tr> <td data-bbox="553 1218 1024 1289"></td> <td data-bbox="1024 1218 1492 1289"></td> </tr> </tbody> </table>	Acids	Bases						
Acids	Bases								

<p>___ 16. I can give examples of chemical formulas of common acids and bases.</p>	<p>List the chemical formulas of three common acids and three common bases.</p> <table border="1" data-bbox="553 1507 1492 1776"> <thead> <tr> <th data-bbox="553 1507 1024 1545">Acids</th> <th data-bbox="1024 1507 1492 1545">Bases</th> </tr> </thead> <tbody> <tr> <td data-bbox="553 1545 1024 1623"></td> <td data-bbox="1024 1545 1492 1623"></td> </tr> <tr> <td data-bbox="553 1623 1024 1701"></td> <td data-bbox="1024 1623 1492 1701"></td> </tr> <tr> <td data-bbox="553 1701 1024 1776"></td> <td data-bbox="1024 1701 1492 1776"></td> </tr> </tbody> </table>	Acids	Bases						
Acids	Bases								
<p>___ 17. I can define neutralization.</p>	<p>Definition: neutralization</p>								

<p>___18. I can identify a neutralization reaction from a list of reactions.</p>	<p>Which of the following equations is a neutralization reaction?</p> <p>A) $6\text{Na} + \text{B}_2\text{O}_3 \rightarrow 3\text{Na}_2\text{O} + 2\text{B}$</p> <p>B) $\text{Mg}(\text{OH})_2 + 2\text{HBr} \rightarrow \text{MgBr}_2 + 2\text{HOH}$</p> <p>C) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$</p> <p>D) $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$</p>
<p>___19. I can state the name of the laboratory equipment that is used to carry out a titration.</p>	<p>Which piece of laboratory equipment is used to carry out a titration?</p>
<p>___20. I can state the purpose of titration.</p>	<p>Why do scientists do titrations?</p>
<p>___21. I can solve for any variable in the titration equation from Reference Table T.</p>	<p>If it requires 56.95 mL of 0.0043 M HNO_3 to neutralize 34.56 mL of LiOH, what is the concentration of the LiOH?</p>
<p>___22. I can state the three types of substances that are electrolytes.</p>	<p>_____, _____, and _____ are three classes of compounds that are electrolytes.</p>

Unit 8: Redox & Electrochemistry

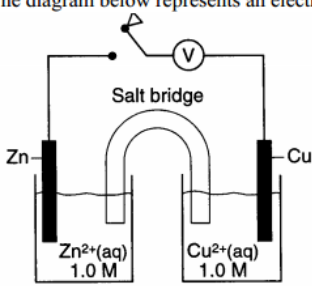
Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 8. I can define oxidation, reduction, oxidation number, and redox reaction</p>	<p>Definitions: oxidation</p> <p>reduction</p> <p>oxidation number</p> <p>redox reaction</p>
<p>___ 9. I can assign oxidation numbers to any element.</p>	<p>Assign oxidation number to each of the elements below.</p> <p>O₂ _____ Li _____ Si _____</p>
<p>___ 10. I can assign oxidation numbers to the elements in a compound.</p>	<p>Assign oxidation numbers to each element in the compounds below.</p> <p>MnCl₃: Mn _____ Cl _____</p> <p>H₂SO₄: H _____ S _____ O _____</p>
<p>___ 11. I can assign oxidation numbers to the elements in a polyatomic ion.</p>	<p>Assign oxidation numbers to each element in the polyatomic ions below.</p> <p>PO₄³⁻: P _____ O _____</p> <p>ClO₃⁻: Cl _____ O _____</p>
<p>___ 12. I can distinguish between an oxidation half-reaction and a reduction half-reaction.</p>	<p>Which half-reaction equation represents the reduction of a potassium ion?</p> <p>A) $K^+ + e^- \rightarrow K$</p> <p>B) $K + e^- \rightarrow K^+$</p> <p>C) $K^+ \rightarrow K + e^-$</p> <p>D) $K \rightarrow K^+ + e^-$</p>

	<p>Given the reaction:</p> $\text{Fe(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Fe}^{2+}(\text{aq}) + \text{Cu(s)}$ <p>Which half-reaction correctly shows the oxidation that occurs?</p> <p>A) $\text{Fe(s)} \rightarrow \text{Fe}^{2+}(\text{aq}) + 2\text{e}^-$ B) $\text{Fe(s)} + 2\text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq})$ C) $\text{Cu}^{2+}(\text{aq}) \rightarrow \text{Cu(s)} + 2\text{e}^-$ D) $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu(s)}$</p>
<p>___ 13. I can state the Law of Conservation of Charge.</p>	<p>The law of Conservation of Charge states</p>
<p>___ 14. I can break a redox reaction into its two half-reactions.</p>	<p>The two half-reactions that come from the following equation are:</p> $\text{Li(s)} + \text{Ag}^+(\text{aq}) \rightarrow \text{Li}^+(\text{aq}) + \text{Ag(s)}$ <p>oxidation half-reaction</p> <p>reduction half-reaction</p>

<p>___ 15. I can balance a redox reaction.</p>	<p>Given the reaction:</p> $\text{___ Cl}_2(\text{g}) + \text{___ Fe}^{2+}(\text{aq}) \rightarrow \text{___ Fe(s)} + \text{___ 2Cl}^-(\text{aq})$ <p>When the equation is correctly balanced using smallest whole numbers, the coefficient of Cl^- will be</p> <p>A) 1 B) 2 C) 6 D) 7</p> <p>.....</p>
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	<p>Which simple oxidation-reduction reaction is <i>not</i> correctly balanced?</p> <p>A) $\text{Sn(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Cu(s)} + \text{Sn}^{2+}(\text{aq})$ B) $\text{Ni(s)} + \text{Sn}^{2+}(\text{aq}) \rightarrow \text{Sn(s)} + \text{Ni}^{2+}(\text{aq})$ C) $2 \text{I}^{-}(\text{aq}) + \text{Fe}^{3+}(\text{aq}) \rightarrow \text{Fe}^{2+}(\text{aq}) + \text{I}_2(\text{s})$ D) $2 \text{I}^{-}(\text{aq}) + \text{Hg}^{2+}(\text{aq}) \rightarrow \text{Hg}(\ell) + \text{I}_2(\text{s})$</p> <p>.....</p> <p>Given the balanced equation:</p> $3 \text{Fe}^{3+}(\text{aq}) + \text{Al(s)} \rightarrow 3 \text{Fe}^{2+}(\text{aq}) + \text{Al}^{3+}(\text{aq})$ <p>What is the total number of moles of electrons lost by 2 moles of Al(s)?</p> <p>A) 1 mole B) 6 moles C) 3 moles D) 9 moles</p>						
<p>___ 16. I can identify a redox reaction from a list of chemical reactions.</p>	<p>Which balanced equation represents a redox reaction?</p> <p>A) $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$ B) $\text{H}_2\text{CO}_3(\text{aq}) \rightarrow \text{H}_2\text{O}(\ell) + \text{CO}_2(\text{g})$ C) $\text{NaOH}(\text{aq}) + \text{HCl}(\text{aq}) \rightarrow \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\ell)$ D) $\text{Mg(s)} + 2\text{HCl}(\text{aq}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g})$</p> <p>.....</p> <p>Which balanced equation represents a redox reaction?</p> <p>A) $\text{PCl}_5 \rightarrow \text{PCl}_3 + \text{Cl}_2$ B) $\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}$ C) $\text{LiBr} \rightarrow \text{Li}^{+} + \text{Br}^{-}$ D) $\text{Ca}^{2+} + \text{SO}_4^{2-} \rightarrow \text{CaSO}_4$</p>						
<p>___ 17. From a list of given list of elements, I can determine which element is most active.</p>	<p>Which of the following elements is most likely to react?</p> <p>A) Cu B) Al C) Li D) Mg</p>						
<p>___ 18. I can state the two types of electrochemical cells.</p>	<p>The two types of electrochemical cells are: _____ and _____</p>						
<p>___ 19. I can compare the two types of electrochemical cells in terms of: components, location of oxidation, location of reduction, direction of electron</p>	<table border="1"> <thead> <tr> <th></th> <th>Voltaic</th> <th>Electrolytic</th> </tr> </thead> <tbody> <tr> <th>Components</th> <td></td> <td></td> </tr> </tbody> </table>		Voltaic	Electrolytic	Components		
	Voltaic	Electrolytic					
Components							

<p>flow, conversion between electrical and chemical energy, and spontaneity of reaction.</p>			
	<p>Oxidation occurs at the</p>		
	<p>Reduction occurs at the</p>		
	<p>Electrons flow from</p>		
	<p>Energy conversion that occurs in this cell</p>		
	<p>Is this reaction spontaneous or does it require an outside power source to happen?</p>		
<p>___20. I can state the purpose of the salt bridge in a voltaic cell.</p>	<p>The purpose of the salt bridge is</p>		
<p>___21. Given an electrochemical cell, I can predict the direction of electron flow.</p>	<p>The diagram below represents an electrochemical cell.</p>  <p>What occurs when the switch is closed?</p> <p>A) Zn is reduced. B) Cu is oxidized. C) Electrons flow from Cu to Zn. D) Electrons flow from Zn to Cu.</p>		
<p>___22. I can explain, in terms of atoms and ions, the changes in mass that take place at the anode and cathode of an electrochemical cell.</p>	<p>Explain, in terms of atoms and ions, why the mass of the cathode increases during the operation of an electrochemical cell.</p> <p>Explain, in terms of atoms and ions, why the mass of the anode decreases during the operation of an electrochemical cell.</p>		

Unit 10: Chemical Reactions

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 9. Given the IUPAC name, I can write the chemical formula for binary compounds.</p>	<p>Write the chemical formula for the following compounds:</p> <p>sodium bromide _____ lithium selenide _____</p> <p>iron (III) fluoride _____ vanadium (V) oxide _____</p>
<p>___ 10. Given the chemical formula, I can write the IUPAC name for binary compounds.</p>	<p>Write the IUPAC name for the following compounds:</p> <p>CrO _____</p> <p>MgI₂ _____</p>
<p>___ 11. Given the IUPAC name, I can write the chemical formula for ternary compounds.</p>	<p>Write the chemical formula for the following compounds:</p> <p>calcium oxalate _____</p> <p>nickel (II) thiosulfate _____</p>
<p>___ 12. Given the chemical formula, I can write the IUPAC name for ternary compounds.</p>	<p>Write the IUPAC name for the following compounds:</p> <p>Sn(C₂H₃O₂)₂ _____</p> <p>(NH₄)₃PO₄ _____</p>
<p>___ 13. I can state the three types of chemical formulas.</p>	<p>The three types of chemical formulas are:</p> <p>_____, _____, &</p> <p>_____</p>

<p>___ 14. I can define empirical formula, molecular formula, and hydrate.</p>	<p>Definitions:</p> <p>empirical formula</p> <p>molecular formula</p> <p>hydrate</p>
<p>___ 15. Given the empirical formula and the molar mass, I can determine the molecular formula of a compound.</p>	<p>What is the molecular formula of a compound that has the empirical formula of CH and a molar mass of 78 g/mol.</p>

<p>___16. I can use particle diagrams to show conservation of mass in a chemical equation.</p>	<p>Using the symbols shown below, complete the equation below to illustrate conservation of mass.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;"> <p>● = Al</p> <p>○ = Br</p> </div> <p style="text-align: center;">$2\text{Al} + 3\text{Br}_2 \rightarrow 2\text{AlBr}_3$</p> <div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> </div>
<p>___17. I can balance a chemical equation showing conservation of mass using the lowest whole number coefficients.</p>	<p>Balance the following chemical equation using the lowest whole number coefficients.</p> <p style="text-align: center;">___$\text{Al}_2(\text{SO}_4)_3$ + ___$\text{Ca}(\text{OH})_2 \rightarrow$ ___$\text{Al}(\text{OH})_3$ + ___CaSO_4</p>
<p>___18. Given a partially balanced equation, I can predict the missing reactant or product.</p>	<p>Use the law of conservation of mass to predict the missing product.</p> <p style="text-align: center;">$2\text{NH}_4\text{Cl} + \text{CaO} \rightarrow 2\text{NH}_3 + \text{_____} + \text{CaCl}_2$</p>
<p>___19. Given a list of chemical reactions, I can classify them as being a synthesis reaction, decomposition reaction, single replacement reaction, or double replacement reaction.</p>	<p>Classify the following reactions as synthesis, decomposition, single replacement, or double replacement.</p> <p>A) $\text{Mg} + 2\text{AgNO}_3 \rightarrow \text{Mg}(\text{NO}_3)_2 + 2\text{Ag}$ _____</p> <p>B) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ _____</p> <p>C) $\text{MgCO}_3 \rightarrow \text{MgO} + \text{CO}_2$ _____</p> <p>D) $\text{MgCl}_2 + 2\text{AgNO}_3 \rightarrow 2\text{AgCl} + \text{Mg}(\text{NO}_3)_2$ _____</p>

<p>___20. Given a balanced equation, I can state the mole ratios between any of the reactants and/or products.</p>	<p>Given the following balanced equation, state the mole ratios between the requested substances.</p> <p style="text-align: center;">$\text{C}_3\text{H}_8(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 3\text{CO}_2(\text{g}) + 4\text{H}_2\text{O}(\text{l})$</p> <p>The mole ratio between C_3H_8 and O_2 is ___C_3H_8:___O_2.</p> <p>The mole ratio between C_3H_8 and CO_2 is ___C_3H_8:___CO_2.</p> <p>The mole ratio between C_3H_8 and H_2O is ___C_3H_8:___H_2O.</p> <p>The mole ratio between CO_2 and O_2 is ___CO_2:___O_2.</p> <p>The mole ratio between H_2O and CO_2 is ___C_3H_8:___O_2.</p>
<p>___21. I can define stoichiometry.</p>	<p>Definition: stoichiometry</p>

<p>___ 22. Given the number of moles of one of the reactants or products, I can determine the number of moles of another reactant or product that is needed to completely use up the given reactant/product.</p>	<p>Using the equation from question #20, determine how many moles of O_2 are needed to completely react with 7.0 moles of C_3H_8.</p> <p>Using the equation from question #20, determine how many moles of CO_2 are produced when 7.0 moles of C_3H_8 completely react.</p>
<p>___ 23. Given the mass or volume of one of the reactants or products, I can determine the mass or volume of another reactant or product that is needed to completely use up the given reactant/product.</p>	<p>Using the equation from question #20, determine how many liters of O_2 are needed to react completely with 88.0 g of C_3H_8.</p> <p>Using the equation from question #20, determine how many grams of H_2O are produced when 88.0 g of C_3H_8 completely react.</p>

Unit 11: Bonding & IMF

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 10. I can state the three types of chemical bonds.</p>	<p>The three types of chemical bonds are: _____, _____, and _____.</p>
<p>___ 11. I can state the number of valence electrons that an atom attains to be most stable.</p>	<p>Atoms are most stable when they have _____ valence electrons.</p>
<p>___ 12. I can state the two types of compounds.</p>	<p>The two types of compounds are _____ and _____.</p>
<p>___ 13. I can define ionic bond, covalent bond, and metallic bond in terms of the types of elements (metals, nonmetals) from which they are formed.</p>	<p>Definition: ionic bond covalent bond metallic bond</p>

<p>___ 14. I can define ionic and covalent bonds based on what happens to the valence electrons.</p>	<p>Definition: In an <u>ionic bond</u>, the valence electrons of the _____ are _____ to the _____ so that each atom attains a stable octet (like noble gases). In a <u>covalent bond</u>, the valence electrons of the two _____ are _____ so that each atom attains a stable octet (like noble gases).</p>
<p>___ 15. I can explain TICS as it relates to chemical bonding.</p>	<p>TICS stands for _____. It helps me remember what happens to the electrons in each type of bond.</p>
<p>___ 16. In terms of valence electrons, I can find similarities and differences between the bonding in several substances.</p>	<p>Explain, in terms of valence electrons, why the bonding in methane (CH₄) is similar to the bonding in water (H₂O).</p> <p>.....</p>

	Explain, in terms of valence electrons, why the bonding in HCl is different than that bonding in NaCl.
<p>___17. I can draw a Lewis dot diagram to represent an ionic compound.</p>	<p>Draw Lewis dot diagrams for the following ionic compounds.</p> <p>LiBr CaCl₂</p>
<p>___18. I can draw a Lewis dot diagram to represent a molecular (covalently bonded) compound.</p>	<p>Draw Lewis dot diagrams for the following molecular substances.</p> <p>H₂O CO₂</p> <p>I₂ CH₄</p>

<p>___19. I can state the number of electrons that are shared in single and multiple covalent bonds.</p>	<p>In a single covalent bond, _____ electrons are shared.</p> <p>In a double covalent bond, _____ electrons are shared.</p> <p>In a triple covalent bond, _____ electrons are shared.</p>
<p>___20. I can explain why the Lewis dot diagrams of ionic compounds have brackets and the Lewis dot diagrams of molecular compounds do not.</p>	<p>Lewis dot diagrams for ionic compounds have brackets because _____.</p> <p>Lewis dot diagrams for molecular compounds do NOT have brackets because _____.</p>
<p>___21. I can state the type of bonding that occurs in the polyatomic ions (Reference Table E) and explain why they have that type of bonding.</p>	<p>Polyatomic ions have _____ bonding because _____.</p>

<p>___ 22. Given the chemical formula for a compound, I can determine the type(s) of bonding in the compound.</p>	<p>State the type(s) of bonding in the following compounds:</p> <p>NaCl_____ CO_____</p> <p>Hg_____ Na₃PO₄_____ & _____</p>
<p>___ 23. I can explain and apply the meaning of BARF as it applies to chemical bonding.</p>	<p>BARF stands for _____</p> <p>This means that when a bond is FORMED, energy is _____</p> <p>and when a bond is BROKEN, energy is _____.</p> <p>-----</p> <p>Given the balanced equation:</p> $N + N \rightarrow N_2$ <p>Which statement describes the process represented by this equation?</p> <p>A) A bond is formed as energy is absorbed. B) A bond is formed as energy is released. C) A bond is broken as energy is absorbed. D) A bond is broken as energy is released.</p>
<p>___ 24. I can explain the difference between a polar covalent bond and a nonpolar covalent bond in terms of the types of nonmetals involved.</p>	<p>Polar covalent bonds are formed when _____ nonmetals share electrons unevenly.</p> <p>Nonpolar covalent bonds form when _____ nonmetals share electrons evenly.</p>
<p>___ 25. I can explain how to determine the degree of polarity of a covalent bond.</p>	<p>The degree of polarity of a covalent bond is determined by the _____ between the elements. .</p>

<p>___ 26. I can explain why one covalent bond is more or less polar than another covalent bond, based on electronegativity difference.</p>	<p>Explain, in terms of electronegativity difference, why the bond between carbon and oxygen in a carbon dioxide molecule is less polar than the bond between hydrogen and oxygen in a water molecule.</p>
<p>___ 27. I can define symmetrical and asymmetrical.</p>	<p>Definition:</p> <p>symmetrical</p> <p>asymmetrical</p>

<p>___31. I can explain and apply the expression "like dissolves like" and give an example.</p>	<p>"Like dissolves like" means</p> <p>An example of "like dissolving like" is _____</p> <p>_____</p> <p>-----</p> <p>Explain, in terms of molecular polarity, why ammonia is more soluble than methane in water at 20°C at standard pressure.</p>
<p>___32. I can define intramolecular forces and intermolecular forces and give examples of each.</p>	<p>Definition: Intramolecular forces</p> <p>Examples:</p> <p>Intermolecular forces</p> <p>Examples:</p>
<p>___33. I can list the intramolecular forces from STRONGEST to WEAKEST.</p>	<p>Strongest _____ bonds > _____ bonds Weakest</p>
<p>___34. I can list the intermolecular forces from STRONGEST to WEAKEST.</p>	<p>Strongest _____ > _____ ></p> <p>_____ Weakest</p>
<p>___35. I can state 8 physical properties of substances that are dependent on the type of bonding in the substance and the strength of the IMF.</p>	<p>Eight physical properties that are dependent on the type of bonding and the strength of the IMF are:</p> <p>1. _____ 2. _____</p> <p>3. _____ 4. _____</p> <p>5. _____ 6. _____</p> <p>7. _____ 8. _____</p>

<p>___36. I can state the relationship between polarity and IMF strength.</p>	<p>As the polarity of the molecule _____, the strength of the IMF _____.</p>
<p>___37. I can state the relationship between size of the molecule and IMF strength.</p>	<p>As the size of the molecule _____, the strength of the IMF _____.</p>
<p>___38. Given the physical state of some substances, I can compare the relative strength of the IMF.</p>	<p>At STP, iodine (I₂) is a crystal and fluorine (F₂) is a gas. Compare the strength of the IMF in a sample of I₂ at STP to the strength of the IMF in a sample of F₂ at STP.</p>
<p>___39. Given the boiling points (or freezing points) of some substances, I can compare the relative strength of the IMF.</p>	<p>At STP, CF₄ boils at -127.8oC and NH₃ boils at -33.3oC. Which substance has stronger IMF? Justify your answer.</p>
<p>___40. I can explain and apply the meaning of "Hydrogen bonding is FON".</p>	<p>"Hydrogen bonding is FON" means _____</p> <p>_____</p> <p>-----</p> <p>Which compound has hydrogen bonding between its molecules?</p> <p>A) CH₄ B) CaH₂ C) KNO₃ D) H₂O</p>
<p>___41. I can define normal boiling point, vapor pressure, volatile, and nonvolatile.</p>	<p>Definition: normal boiling point</p> <p>vapor pressure</p> <p>volatile</p> <p>nonvolatile</p>

<p>___ 42. I can determine the vapor pressure of ethanol, ethanoic acid, propane, or water at a given temperature.</p>	<p>What is the vapor pressure of ethanol at 56°C?</p>
<p>___ 43. I can state the relationship between the strength of IMF and vapor pressure.</p>	<p>As the strength of IMF _____, vapor pressure _____.</p>
<p>___ 44. I can explain the how adding a nonvolatile solute to a pure solvent affects the freezing point of the solvent.</p>	<p>When a nonvolatile solute is added to a solvent, the freezing point of the solvent _____ because the solute _____</p> <p>_____</p> <p>The more solute that is added, the _____ the freezing point gets.</p>
<p>___ 45. I can explain the how adding a nonvolatile solute to a pure solvent affects the boiling point of the solvent.</p>	<p>When a nonvolatile solute is added to a solvent, the boiling point of the solvent _____ because the solute _____</p> <p>_____</p> <p>The more solute that is added, the _____ the boiling point gets.</p>

<p>___ 46. I can state 5 physical properties of ionic substances.</p>	<p>Five physical properties of ionic substances are:</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p>
<p>___ 47. I can identify a substance as "ionic" based on its properties.</p>	<p>A solid substance was tested in the laboratory. The results are shown below.</p> <p>*dissolves in water *is an electrolyte * has a high melting point</p>

	<p>Based on these results, the solid substance could be</p> <p>A) Hg B) AuCl C) CH₄ D) C₁₂H₂₂O₁₁</p> <hr/> <p>Based on bond type, which compound has the highest melting point?</p> <p>A) CH₄ B) C₁₂H₂₂O₁₁ C) NaCl D) C₅H₁₂</p>												
<p>___ 48. I can state 5 physical properties of molecular substances.</p>	<p>Five physical properties of molecular substances are:</p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p>												
<p>___ 49. I can identify a substance as “molecular” based on its properties.</p>	<p>A chemist performs the same tests on two homogeneous white crystalline solids, <i>A</i> and <i>B</i>. The results are shown in the table below.</p> <table border="1" data-bbox="581 1045 1273 1255"> <thead> <tr> <th></th> <th>Solid A</th> <th>Solid B</th> </tr> </thead> <tbody> <tr> <td>Melting Point</td> <td>High, 801°C</td> <td>Low, decomposes at 186°C</td> </tr> <tr> <td>Solubility in H₂O (grams per 100.0 g H₂O at 0°C)</td> <td>35.7</td> <td>3.2</td> </tr> <tr> <td>Electrical Conductivity (in aqueous solution)</td> <td>Good conductor</td> <td>Nonconductor</td> </tr> </tbody> </table> <p>The results of these tests suggest that</p> <p>A) both solids contain only ionic bonds B) both solids contain only covalent bonds C) solid <i>A</i> contains only covalent bonds and solid <i>B</i> contains only ionic bonds D) solid <i>A</i> contains only ionic bonds and solid <i>B</i> contains only covalent bonds</p> <hr/> <p>Which terms describe a substance that has a low melting point and poor electrical conductivity?</p> <p>A) covalent and metallic B) covalent and molecular C) ionic and molecular D) ionic and metallic</p>		Solid A	Solid B	Melting Point	High, 801°C	Low, decomposes at 186°C	Solubility in H ₂ O (grams per 100.0 g H ₂ O at 0°C)	35.7	3.2	Electrical Conductivity (in aqueous solution)	Good conductor	Nonconductor
	Solid A	Solid B											
Melting Point	High, 801°C	Low, decomposes at 186°C											
Solubility in H ₂ O (grams per 100.0 g H ₂ O at 0°C)	35.7	3.2											
Electrical Conductivity (in aqueous solution)	Good conductor	Nonconductor											

Unit 12: Reaction Rates & Equilibrium

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 11. I can define effective collision and collision theory</p>	<p>Definition: effective collision</p> <p>collision theory</p>
<p>___ 12. I can state and apply the relationship between temperature and reaction rate in terms of collision theory.</p>	<p>As the temperature _____, the reaction rate for most chemical reactions _____ because there are _____ effective collisions between particles.</p> <p>-----</p> <p>Given the reaction:</p> $2\text{Mg(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{MgO(s)}$ <p>At which temperature would the reaction occur at the greatest rate?</p> <p>A) 0°C B) 15°C C) 95°C D) 273K</p>
<p>___ 13. I can state and apply the relationship between surface area and reaction rate in terms of collision theory.</p>	<p>As the surface area _____, the reaction rate _____ because there are _____ effective collisions between particles.</p> <p>-----</p> <p>At STP, which 4.0 g sample of Zn(s) will react most quickly with dilute hydrochloric acid?</p> <p>A) lump B) bar C) powdered D) sheet metal</p>
<p>___ 14. I can state and apply the relationship between concentration and reaction rate in terms of collision theory.</p>	<p>As the concentration _____, the reaction rate _____ because there are _____ effective collisions between particles.</p> <p>-----</p> <p>At 20°C, a reaction between powdered Zn(s) and hydrochloric acid will occur most quickly if the concentration of the HCl is</p> <p>A) 1.0 M B) 1.5 M C) 2.5 M D) 2.8 M</p>

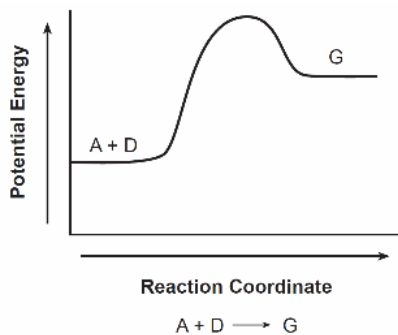
<p>___ 15. I can state the unit used to measure energy.</p>	<p>Energy is measured in _____.</p>
<p>___ 16. Based on the location of the energy term, I can determine if the reaction is exothermic or endothermic.</p>	<p>Given the following balanced equation:</p> $I + I \rightarrow I_2 + 146.3 \text{ kJ}$ <p>Is this reaction exothermic or endothermic? Justify your answer.</p>
<p>___ 17. I can use Table I to determine if a reaction is exothermic or endothermic.</p>	<p>Which balanced equation represents an endothermic reaction?</p> <p>A) $C(s) + O_2(g) \rightarrow CO_2(g)$ B) $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ C) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ D) $N_2(g) + O_2(g) \rightarrow 2NO(g)$</p>

<p>___ 19. I can define potential energy diagram, reaction coordinate, PE_{reactant}, PE_{product}, heat of reaction (DH), activation energy, catalyst.</p>	<p>Definitions:</p> <p>potential energy diagram</p> <p>reaction coordinate</p> <p>PE_{reactant}</p> <p>PE_{product}</p> <p>heat of reaction (DH)</p> <p>activation energy</p> <p>catalyst</p>
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entropy

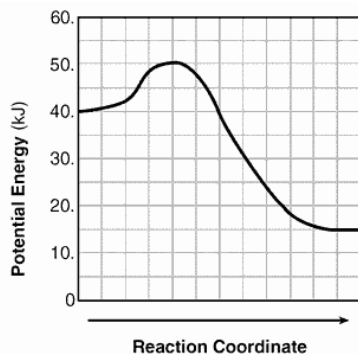
___20. Given a potential energy diagram, I can determine if the reaction is exothermic or endothermic.

Give the potential energy diagram below, determine if the reaction is exothermic or endothermic. Justify your answer.



___21. Given a potential energy diagram, I can determine the PE_{reactant} , PE_{product} , ΔH , and activation energy.

Given the potential energy diagram below, determine the PE_{reactant} , PE_{product} , ΔH , and the activation energy.



$PE_{\text{reactant}} =$

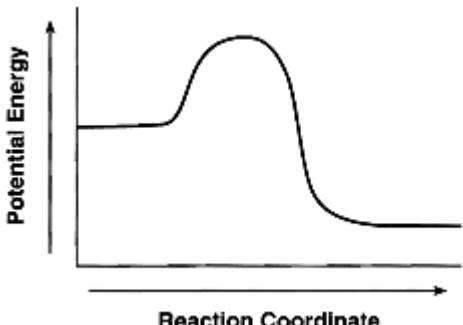
$PE_{\text{product}} =$

$\Delta H =$

activation energy =

___22. Given a potential energy diagram for an uncatalyzed reaction diagram, I can how the diagram will change when a catalyst is added.

Draw a dotted line on the potential energy diagram shown below to indicate how it will change if a catalyst is added.

	
<p>___ 23. I can rank the three phases of matter from least entropy to most entropy.</p>	<p>Least entropy _____ < _____ < _____ Most entropy</p>
<p>___ 24. I can state the trends in nature for entropy and energy.</p>	<p>In nature most systems in nature tend to undergo reactions that have a(n) _____ in entropy and a(n) _____ in energy. As Mrs. S says, nature is like a teenager ---- lazy and messy!</p>

<p>___ 25. Given a balanced equation, I can determine if the reaction results in an overall increase or decrease in entropy.</p>	<p>Which reaction results in an increase in entropy?</p> <p>A) $\text{CO}_2(\text{g}) \rightarrow \text{CO}_2(\text{s})$ B) $\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{O}(\text{s})$ C) $\text{Ca}(\text{s}) + 2 \text{H}_2\text{O}(\ell) \rightarrow \text{Ca}(\text{OH})_2(\text{aq}) + \text{H}_2(\text{g})$ D) $\text{NaCl}(\text{aq}) + \text{AgNO}_3(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$</p> <hr/> <p>Which equation shows an increase in entropy?</p> <p>A) $\text{CO}_2(\text{g}) \rightarrow \text{CO}_2(\text{s})$ B) $\text{CO}_2(\ell) \rightarrow \text{CO}_2(\text{g})$ C) $\text{CH}_3\text{OH}(\ell) \rightarrow \text{CH}_3\text{OH}(\text{s})$ D) $\text{CH}_3\text{OH}(\text{g}) \rightarrow \text{CH}_3\text{OH}(\ell)$</p> <hr/> <p>Which reaction has the greatest increase in entropy?</p> <p>A) $2 \text{H}_2\text{O}(\ell) \rightarrow 2 \text{H}_2(\text{g}) + \text{O}_2(\text{g})$ B) $2 \text{H}_2\text{O}(\text{g}) \rightarrow 2 \text{H}_2(\text{g}) + \text{O}_2(\text{g})$ C) $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2\text{O}(\ell)$ D) $\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{O}(\text{s})$</p>
<p>___ 26. I can define forward reaction, reverse reaction, reversible reaction, and closed system</p>	<p>Definitions: forward reaction</p> <p>reverse reaction</p>

	<p>reversible reaction</p> <p>closed system</p>
<p>___ 27. I can state the three types of equilibrium.</p>	<p>The three types of equilibrium are:</p> <p>_____ equilibrium</p> <p>_____ equilibrium and</p> <p>_____ equilibrium</p>
<p>___ 28. I can state two conditions that apply to all systems at equilibrium.</p>	<p>In a system at equilibrium the _____ of the forward and reverse reaction must be _____ and the _____ of the reactants and products must be _____.</p>
<p>___ 29. Given a list of reactions, I can identify reactions that show equilibrium (chemical, phase, or solution).</p>	<p>Which balanced equation represents phase equilibrium?</p> <p>A) $\text{H}_2(\text{g}) + \text{I}_2(\text{s}) \rightleftharpoons 2\text{HI}(\text{g})$</p> <p>B) $\text{I}_2(\text{s}) \rightleftharpoons \text{I}_2(\text{g})$</p> <p>C) $\text{KCl}(\text{s}) \xrightleftharpoons{\text{H}_2\text{O}} \text{KCl}(\text{aq})$</p> <p>D) $2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g}) \rightleftharpoons 2\text{KClO}_3$</p> <hr/> <p>Which balanced equation represents solution equilibrium?</p> <p>A) $\text{H}_2(\text{g}) + \text{I}_2(\text{s}) \rightleftharpoons 2\text{HI}(\text{g})$</p> <p>B) $\text{I}_2(\text{s}) \rightleftharpoons \text{I}_2(\text{g})$</p> <p>C) $\text{KCl}(\text{s}) \xrightleftharpoons{\text{H}_2\text{O}} \text{KCl}(\text{aq})$</p> <p>D) $2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g}) \rightleftharpoons 2\text{KClO}_3$</p> <hr/> <p>Which balanced equation represents chemical equilibrium?</p> <p>A) $\text{H}_2(\text{g}) + \text{I}_2(\text{s}) \rightleftharpoons 2\text{HI}(\text{g})$</p> <p>B) $\text{I}_2(\text{s}) \rightleftharpoons \text{I}_2(\text{g})$</p> <p>C) $\text{KCl}(\text{s}) \xrightleftharpoons{\text{H}_2\text{O}} \text{KCl}(\text{aq})$</p> <p>D) $2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g}) \rightleftharpoons 2\text{KClO}_3$</p>

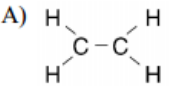
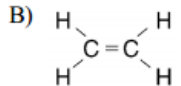
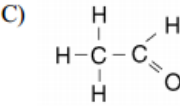
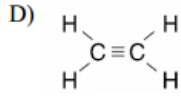
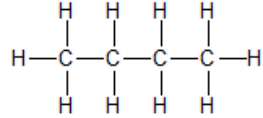
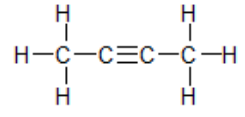
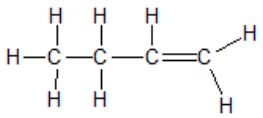
<p>___30. In terms of saturation, I can describe a solution that is at equilibrium.</p>	<p>In terms of saturation, a solution that is at equilibrium must be _____.</p>												
<p>___31. I can state LeChatelier's Principle.</p>	<p>LeChatelier's Principle states</p>												
<p>___32. Given a balanced equation at equilibrium, I can predict the direction of shift in the equilibrium when the temperature, concentration, or pressure is changed or if a catalyst is added.</p>	<p>Given the reaction at equilibrium:</p> $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}) + 392\text{kJ}$ <p>Predict the direction of shift in the equilibrium (right, left, no shift) when the following changes are made to the system.</p> <table border="1" data-bbox="553 684 1500 963"> <thead> <tr> <th data-bbox="553 684 1024 722">Change</th> <th data-bbox="1024 684 1500 722">Direction of Shift</th> </tr> </thead> <tbody> <tr> <td data-bbox="553 722 1024 772">Increase concentration of SO_2</td> <td data-bbox="1024 722 1500 772"></td> </tr> <tr> <td data-bbox="553 772 1024 823">Increase concentration of SO_3</td> <td data-bbox="1024 772 1500 823"></td> </tr> <tr> <td data-bbox="553 823 1024 873">Increase temperature</td> <td data-bbox="1024 823 1500 873"></td> </tr> <tr> <td data-bbox="553 873 1024 924">Increase pressure</td> <td data-bbox="1024 873 1500 924"></td> </tr> <tr> <td data-bbox="553 924 1024 963">Add a catalyst</td> <td data-bbox="1024 924 1500 963"></td> </tr> </tbody> </table>	Change	Direction of Shift	Increase concentration of SO_2		Increase concentration of SO_3		Increase temperature		Increase pressure		Add a catalyst	
Change	Direction of Shift												
Increase concentration of SO_2													
Increase concentration of SO_3													
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Increase pressure													
Add a catalyst													

Unit 13: Organic Chemistry

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

<p>___ 12. I can define organic compound, saturated hydrocarbon, unsaturated hydrocarbon, and isomer.</p>	<p>Definitions: organic compound</p> <p>saturated hydrocarbon</p> <p>unsaturated hydrocarbon</p> <p>isomer</p>
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<p>___ 13. I can expand a condensed structural formula to show the structural formula of an organic compound.</p>	<p>Draw the complete structural formula for $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$.</p> <p>Draw the complete structural formula for $\text{CH}_3\text{CHCHCH}_3$.</p>
<p>___ 14. I can state the name and symbol of the element that is capable of forming rings, chains, and networks.</p>	<p>The element that is capable of forming rings, chains, and networks is _____ . Its symbol is _____ .</p>
<p>___ 15. I can explain the meaning of and apply HONC1234.</p>	<p>HONC1234 tells me that _____</p> <p>-----</p>

	<p>Which structural formula <i>correctly</i> represents a hydrocarbon molecule?</p> <p>A)  B) </p> <p>C)  D) </p>
<p>___16. Given the formula, I can determine if a compound is a hydrocarbon or not.</p>	<p>Which formula represents a hydrocarbon?</p> <p>A) CH₃CH₂CH₂CHO B) CH₃CH₂CH₂CH₃ C) CH₃CH₂CH₂COOH D) CH₃CH₂COOCH₃</p>
<p>___17. Given the name, I can use Reference Table P to determine how many carbon atoms are in a compound.</p>	<p>Determine how many carbon atoms are in each of the following compounds:</p> <p>decane _____ ethene _____ 3-nonene _____ 1-pentyne _____</p>
<p>___18. Given the name, I can use Reference Table Q to determine to which class of hydrocarbons a compound belongs.</p>	<p>Determine the homologous series of hydrocarbons to which each of the following belongs:</p> <p>decane _____ 2-decene _____ 3-nonene _____ 1-pentyne _____</p>
<p>___19. Given the name, I can determine if the hydrocarbon is saturated or unsaturated.</p>	<p>Determine if each of the following is a saturated or unsaturated hydrocarbon.</p> <p>decane _____ ethene _____ 3-nonene _____ 1-pentyne _____</p>
<p>___20. Given the formula, I can determine to which homologous series a hydrocarbon belongs.</p>	<p>Determine the homologous series of hydrocarbons to which each of the following belongs:</p> <p> belongs to the _____ series.</p> <p>-----</p> <p> belongs to the _____ series.</p> <p>-----</p> <p> belongs to the _____ series.</p>
<p>___21. Given the formula, I can determine if a hydrocarbon is saturated or unsaturated.</p>	<p>Determine if each of the following is a saturated or unsaturated hydrocarbon.</p>

	<p>Which structural formula represents an alcohol?</p> <p>A) $\begin{array}{c} \text{H} \quad \text{O} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$</p> <p>B) $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ C) $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C} \\ \quad // \\ \text{H} \quad \text{O} \end{array}$</p> <p>D) $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C} \\ \quad // \quad \\ \text{H} \quad \text{O} \quad \text{OH} \end{array}$</p>
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<p>____ 25. I can use Reference Tables P & Q and IUPAC nomenclature to name simple hydrocarbons.</p>	<p>Name the following hydrocarbons.</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \quad \text{H} \quad \text{H} \\ \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{H} \quad \text{H} \\ \quad \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}\equiv\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \quad \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{H} \\ \quad \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}=\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p>
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<p>____ 26. I can use Reference Tables P & R and IUPAC nomenclature to name simple compounds in any of the classes of organic compounds.</p>	<p>Name the following organic compounds.</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{O} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{O}-\text{H} \\ \quad \quad \quad \quad // \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C} \\ \quad \quad \quad \quad \backslash \\ \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{O} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{H} \\ \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{N}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}\equiv\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C} \\ \quad \quad \quad // \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{O} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{H} \\ \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{N}-\text{H} \\ \quad \quad \quad \quad \backslash \\ \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{O} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{Br} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \quad \quad \text{H} \quad \text{H} \\ \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{O}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \quad \\ \text{H} \quad \quad \quad \text{H} \quad \text{H} \end{array}$ _____</p> <p>$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{H} \\ \quad \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{O}-\text{C}-\text{H} \\ \quad \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \quad \text{H} \end{array}$ _____</p>
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____27. I can use F-SCAPES to list and describe the 7 types of organic reactions.

F stands for _____. This type of organic reaction results from a reaction of _____ to form _____ and _____. It typically requires a catalyst, in the form of an enzyme to occur.

S stands for _____. This type of organic reaction happens when _____ hydrocarbons replace one of the _____ for some other element (often a halide).

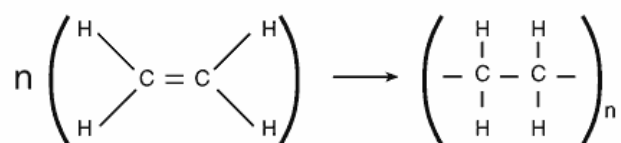
C stands for _____. In this type of organic reaction a _____ reacts with _____ to form _____ and _____. It is an exothermic reaction.

A stands for _____. In this type of organic reaction an _____ becomes a _____ when the double bond breaks and two atoms of another element (often a halide) are added.

____27. I can use F-SCAPES to list and describe the 7 types of organic reactions. (continued)

P stands for _____. In this type of organic reaction many _____ are linked together to form a _____. A generalized form of this reaction looks like this....

Note: n and n are very large numbers equal to about 2000.

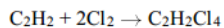


E stands for _____. In this type of organic reaction an _____ reacts with a _____ to form an _____ and _____. The products of this reaction are typically fragrant.

S stands for _____. In this type of organic reaction a _____ reacts with a _____ to form _____. You can really “clean up” if you remember this organic reaction.

____28. Given an equation, I can identify the type of organic reaction that is occurring.

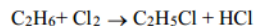
Given the balanced equation for an organic reaction:



This reaction is best classified as

- A) addition B) esterification
C) fermentation D) substitution

Given the equation:



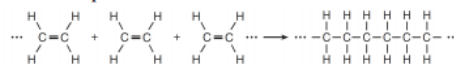
This reaction is best described as

- A) addition involving a saturated hydrocarbon
B) addition involving an unsaturated hydrocarbon
C) substitution involving a saturated hydrocarbon
D) substitution involving an unsaturated hydrocarbon

Which equation represents fermentation?

- A) $\text{C}_2\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_6\text{Cl} + \text{HCl}$
B) $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2 \text{C}_2\text{H}_5\text{OH} + 2 \text{CO}_2$
C) $\text{CH}_3\text{COOH} + \text{CH}_3\text{OH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$
D) $n\text{C}_2\text{H}_4 \rightarrow (\text{C}_2\text{H}_4)_n$

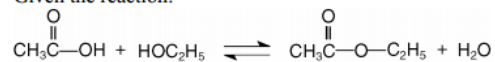
Given the equation:



Which type of reaction is represented by this equation?

- A) combustion B) esterification
C) polymerization D) substitution

Given the reaction:



This reaction is an example of

- A) fermentation B) saponification
C) hydrogenation D) esterification

Which reaction best represents the complete combustion of ethene?

- A) $\text{C}_2\text{H}_4 + \text{HCl} \rightarrow \text{C}_2\text{H}_5\text{Cl}$
B) $\text{C}_2\text{H}_4 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_4\text{Cl}_2$
C) $\text{C}_2\text{H}_4 + 3 \text{O}_2 \rightarrow 2 \text{CO}_2 + 2 \text{H}_2\text{O}$
D) $\text{C}_2\text{H}_4 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_5\text{OH}$