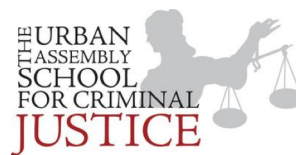


Name: _____ Date: _____

Chemistry ~ Ms. Hart **Class:** Anions or Cations



February Break Review Sheets - _____ /150

Chemistry has a LOT of words. Take this break to review and strengthen your knowledge of the vocabulary you see and will continue to see in chemistry class. All vocabulary words for this year are at the end of this packet.

Along with having a **complete glossary** in your binder, make an account on StudyBlue.com. Create a set of flash cards for every vocabulary word we have from this year. Play around with the site and either make your own, or use definitions study blue already has! You can even get an app to have it on your phone. Study on the subway, bus or car. Together, we will master this vocab! Good luck!

In addition to your vocabulary, complete the packet below which you will submit and will be graded as ONE TEST GRADE for marking period 4!

Part 1: (.5 each) SCORE: ____/10

Name	Symbol	Atomic Number
Hydrogen		
Helium		
Lithium		
Beryllium		
Boron		
Carbon		
Nitrogen		
Oxygen		
Fluorine		
Neon		
Sodium		
Magnesium		
Aluminum		
Silicon		
Phosphorus		
Sulfur		
Chlorine		
Argon		
Potassium		
Calcium		

Part 2: (.5 each) SCORE: ____/10

Name	Symbol	Atomic Number
		7
		10
		8
		15
		20
		17
		1
		3
		11
		2
		9
		13
		12
		19
		4
		18
		6
		16
		14
		5

Part 3: Specific Heat: (worth 2 each) SCORE: _____ /8

Sample Problem 1

The specific heat of gold is $0.134 \text{ J/g}^\circ\text{C}$. How many joules will it take to make the temperature of a 20.0 g nugget go up 10.0°C ?

$$Q = (20 \text{ g}) (10^\circ\text{C}) (0.134 \text{ J/g}^\circ\text{C}) = 26.8 \text{ J}$$

Sample Problem 2

What is the specific heat of silicon if a 5.00 g sample is heated from 22.0°C to 42.0°C by adding 75.24 J ?

$$\Delta T = T_f - T_i = 42.0^\circ\text{C} - 22.0^\circ\text{C} = 20.0^\circ\text{C}$$

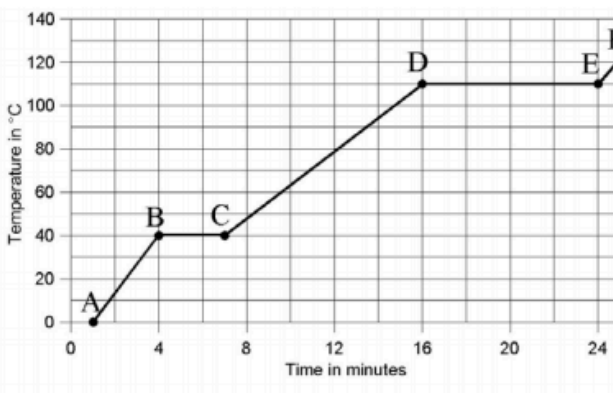
$$c_p = \frac{Q}{m\Delta T} = \frac{75.24 \text{ J}}{(5.00 \text{ g})(20.0^\circ\text{C})} = 0.752 \frac{\text{J}}{\text{g}^\circ\text{C}}$$

Answer the following questions by referring to the examples and equations above.

1. The specific heat of aluminum is $0.88 \text{ J/g}^\circ\text{C}$. How many joules will it take to make the temperature of a $50. \text{ g}$ nugget go up from $20.^\circ\text{C}$ to $70.^\circ\text{C}$?
2. What is the specific heat of silver if an 80.0 g sample is heated from 24.0°C to 49.0°C by adding 468.2 J ?
3. The specific heat of iron is $0.46 \text{ J/g}^\circ\text{C}$. How many joules will it take to make the temperature of a $150. \text{ g}$ bar go up from 25°C to $60.^\circ\text{C}$?
4. What is the specific heat of copper if a 75 g sample is heated from $20.^\circ\text{C}$ to 24°C by adding 117 J ?

Part 4: Heating Curve SCORE: _____ /11

- _____ 1. What is the temperature at which the substance can be both in the solid and the liquid phase?
- _____ 2. During which lettered intervals is the internal potential energy of the substance increasing?
- _____ 3. During which lettered intervals is the kinetic energy of the particles increasing?
- _____ 4. How much heat is added to the substance from the time it stops melting to the time that it begins to boil?
- _____ 5. What is the total heat needed to melt the substance (starting at time 0)?
- _____ 6. What is the total heat needed to vaporize the substance (starting at time 0)?
- _____ 7. What is the heat of vaporization of the substance?
- _____ 8. During which lettered intervals is the substance solid?
- _____ 9. During which lettered intervals is the substance in the liquid phase?
- _____ 10. During which lettered intervals is the substance in the vapor phase?
- _____ 11. What is the temperature at which the substance can be both in the liquid and the vapor phase?



Part 5: Ions SCORE: _____ /18 (2 for each row)

Determine the charge on ions of each of the elements listed in the table below by filling in the table based on the examples provided using sodium and fluorine.

Element	Atom				Ion				Number of Electrons lost/gained
	Electron Configuration	Number of Electrons	Number of Protons	Charge	Electron Configuration	Number of Electrons	Number of Protons	Charge	
Na	2-8-1	11	11	0	2-8	10	11	+1	1 lost
F	2-7	9	9	0	2-8	10	9	-1	1 gained
Ca									
O									
Al									
Cl									
Mg									
N									
S									
Cu									
C									

Part 6: Writing Formulas SCORE: _____ /36

Directions: Write chemical formulas for the compounds in each box. The names are found by finding the intersection between the cations and anions. Example: The first box is the intersection between the “zinc” cation and the “chloride” anion, so you should write “ZnCl₂”, as shown.

Criss-cross the ions! Use the example to help!		Cations					
		Zinc	Iron (II)	Iron (III)	Lithium	Silver	Lead (IV)
Anions	Formulas	Zn ²⁺					
Chloride	Cl ⁻	ZnCl ₂					
Bromide							
Nitrate							
Oxide							
Nitride							
Sulfate							

Part 7: Regents Questions

SCORE: _____/56

For the following multiple-choice Regents Questions, you will do the following:

Read the question;

Underline key terms, concepts

Decide what question is asking (definition, cause/effect/trend/etc)

Eliminate wrong choices

_____ 1. Which subatomic particle has no charge?

- (1) neutron
- (2) electron
- (3) alpha particle
- (4) beta particle

_____ 2. At STP, which physical property of aluminum always remains the same from sample to sample?

- (1) mass
- (2) density
- (3) length
- (4) volume

_____ 3. Which process is a chemical change?

- (1) melting of ice
- (2) boiling of water
- (3) subliming of ice
- (4) decomposing of water

_____ 4. Which process represents a chemical change?

- (1) melting of ice
- (2) corrosion of copper
- (3) evaporation of water
- (4) crystallization of sugar

_____ 5. The heat energy required to change a unit mass of a liquid into a gas at constant temperature is called

- (1) heat of vaporization
- (2) heat of formation
- (3) heat of solution
- (4) heat of fusion

_____ 6. [1 point] How do the boiling point and freezing point of a solution of water and calcium chloride at standard pressure compare to the boiling point and freezing point of water at standard pressure?

- (1) Both the freezing point and boiling point of the solution are higher.
- (2) Both the freezing point and boiling point of the solution are lower.
- (3) The freezing point of the solution is higher and the boiling point of the solution is lower.
- (4) The freezing point of the solution is lower and the boiling point of the solution is higher.

_____ 7. When sodium chloride (salt) is dissolved in water, the resulting solution is classified as a

- (1) heterogeneous compound
- (2) homogeneous compound
- (3) heterogeneous mixture
- (4) homogeneous mixture

_____ 8. Which type of matter is composed of two or more different elements that are chemically combined in a definite ratio?

- (1) a solution
- (2) a compound
- (3) a homogeneous mixture
- (4) a heterogeneous mixture

_____ 9. [1 point] Which sample of water contains particles having the highest average kinetic energy?

- (1) 25 mL of water at 95°C
- (2) 45 mL of water at 75°C
- (3) 75 mL of water at 75°C
- (4) 95 mL of water at 25°C

_____ 10. What is the net charge on an ion that has 9 protons, 11 neutrons, and 10 electrons?

- (1) 1+
- (2) 1-
- (3) 2+
- (4) 2-

_____ 11. Which statement is true about a proton and an electron?

- (1) They have the same masses and the same charges.
- (2) They have the same masses and different charges.
- (3) They have different masses and the same charges.
- (4) They have different masses and different charges.

_____ 12. The total mass of the protons in an atom of gold-198 is approximately

- (1) 79 atomic mass units
- (2) 119 atomic mass units
- (3) 198 atomic mass units
- (4) 277 atomic mass units

_____ 13. Isotopes of an element must have different

- (1) atomic numbers
- (2) numbers of protons
- (3) mass numbers
- (4) numbers of electrons

_____ 14. The atomic mass of an element is the weighted average of the

- (1) number of protons in the isotopes of that element
- (2) number of neutrons in the isotopes of that element
- (3) atomic numbers of the naturally occurring isotopes of that element
- (4) atomic masses of the naturally occurring isotopes of that element

_____ 15. What is the symbol for an atom containing 20 protons and 22 neutrons?

- (1) $^{42}_{20}\text{Ca}$
- (2) $^{40}_{20}\text{Ca}$
- (3) $^{42}_{22}\text{Ti}$
- (4) $^{40}_{22}\text{Ti}$

_____ 16. According to the wave-mechanical model of the atom, electrons in an atom

- (1) are most likely found in the excited state
- (2) have a positive charge
- (3) are located in orbitals outside the nucleus
- (4) travel in defined circles

_____ 17. Which electron configuration represents an atom of aluminum in an excited state?

- (1) 2-7-4
- (2) 2-7-7
- (3) 2-8-6
- (4) 2-8-3

_____ 18. Which total mass is the *smallest*?

- (1) the mass of 2 electrons
- (2) the mass of 2 neutrons
- (3) the mass of 1 electron plus the mass of 1 proton
- (4) the mass of 1 neutron plus the mass of 1 electron

_____ 19. Which equation represents sublimation?

- (1) $\text{Hg(l)} \rightarrow \text{Hg(s)}$
- (2) $\text{H}_2\text{O(s)} \rightarrow \text{H}_2\text{O(g)}$
- (3) $\text{NH}_3\text{(g)} \rightarrow \text{NH}_3\text{(l)}$
- (4) $\text{CH}_4\text{(l)} \rightarrow \text{CH}_4\text{(g)}$

_____ 20. The atomic number of an atom always equal to the number of its

- (1) protons, only
- (2) protons plus electrons
- (3) neutrons, only
- (4) protons plus neutrons

_____ 21. In a laboratory where the air temperature is 22°C, a steel cylinder at 100.°C is submerged in a sample of water at 40.°C. In this system, heat flows from

- (1) both the air and the water to the cylinder
- (2) both the cylinder and the air to the water
- (3) the air to the water and from the water to the cylinder
- (4) the cylinder to the water and from the water to the air

_____ 22. If two systems at different temperatures have contact with each other, heat will flow from the system at:

- (1) 20°C to a system at 303 K
- (2) 30°C to a system at 313 K
- (3) 40°C to a system at 293 K
- (4) 50°C to a system at 333 K

_____ 23. A 100.00-gram sample of naturally occurring boron contains 19.78 grams of boron-10 (atomic mass = 10.01 atomic mass units) and 80.22 grams of boron-11 (atomic mass = 11.01 atomic mass units). Which numerical setup can be used to determine the atomic mass of naturally occurring boron?

- (1) $(0.1978)(10.01) + (0.8022)(11.01)$
- (2) $(0.8022)(10.01) + (0.1978)(11.01)$
- (3) $\frac{(0.1978)(10.01)}{(0.8022)(11.01)}$
- (4) $\frac{(0.8022)(10.01)}{(0.1978)(11.01)}$

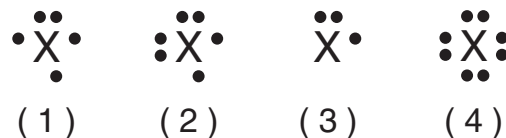
_____ 24. Which substance can be decomposed by chemical change?

- (1) Copper (Cu)
- (2) Boron (B)
- (3) Carbon dioxide (CO₂)
- (4) Magnesium (Mg)

_____ 25. What is the total number of valence electrons in a germanium atom in the ground state?

- (1) 22
- (2) 2
- (3) 32
- (4) 4

_____ 26. An atom in the ground state contains a total of 5 electrons, 5 neutrons, and 5 protons. Which Lewis electron-dot diagram represents this atom?



_____ 27. Compared to the atoms of nonmetals in Period 3, the atoms of metals in Period 3 have

- (1) fewer valence electrons
- (2) more valence electrons
- (3) fewer electron shells
- (4) more electron shells

_____ 28. The bonds in BaO are best described as

- (1) covalent, because valence electrons are shared
- (2) covalent, because valence electrons are transferred
- (3) ionic, because valence electrons are shared
- (4) ionic, because valence electrons are transferred

_____ 29. Which element forms an ionic compound when it reacts with lithium?

- (1) K
- (2) Fe
- (3) Kr
- (4) Br

_____30.The chemical bond between which two atoms is most polar?

- (1) C–N
- (2) H–H
- (3) S–Cl
- (4) Si–O

_____31.Which substance cannot be decomposed into simpler substances?

- (1) Ammonia (NH₃)
- (2) Aluminum (Al)
- (3) Methane (CH₄)
- (4) Methanol (CH₄O)

_____32.In the late 1800s, experiments using cathode ray tubes led to the discovery of the

- (1) electron
- (2) positron
- (3) neutron
- (4) proton

_____33.Which atom has a nucleus that contains 13 protons and 14 neutrons?

- (1) Mg
- (2) Al
- (3) Be
- (4) N

_____34.How many protons are in the nucleus of an atom of beryllium?

- (1) 5
- (2) 9
- (3) 2
- (4) 4

_____35.As a result of the gold foil experiment, it was concluded that an atom

- (1) contains protons, neutrons, and electrons
- (2) contains a small, dense nucleus
- (3) has positrons and orbitals
- (4) is a hard, indivisible sphere

_____36.Which phrase describes the distribution of charge and the polarity of a CH₄ molecule?

- (1) symmetrical and polar
- (2) symmetrical and nonpolar
- (3) asymmetrical and polar
- (4) asymmetrical and nonpolar

_____37.Which compound has the strongest hydrogen bonding between its molecules?

- (1) HBr
- (2) HCl
- (3) HF
- (4) HI

_____38.Which two particles each have a mass approximately equal to one atomic mass unit?

- (1)electron and neutron
- (2)proton and electron
- (3)proton and neutron
- (4)electron and positron

_____39. calcium cyanide is:

The formula for

- (1) CaCN₂
- (2) Ca(CN)₂
- (3) CaSCN₂
- (4) Ca(SCN)₂

_____40. What is the correct formula for ammonium carbonate?

- (1) NH₄(CO₃)₂
- (2) NH₄CO₃
- (3) (NH₄)₂(CO₃)₂
- (4) (NH₄)₂CO₃

_____41.What is the total charge of the nucleus of a carbon atom?

- (1)0
- (2)+12
- (3)-6
- (4)+6

_____42.Which list of elements contains a metal, a metalloid and a nonmetal?

- (1) Zn, Ga, Ge
- (2) Si, Ge, Sn
- (3) Cd, Sb, I
- (4) F, Cl, Br

_____43.What are two properties of most nonmetals?

- (1) high ionization energy and poor electrical conductivity
- (2) high ionization energy and good electrical conductivity
- (3) low ionization energy and poor electrical conductivity
- (4) low ionization energy and good electrical conductivity

_____44.Which element has the *lowest* electronegativity value?

- (1) F
- (2) Fr
- (3) Cl
- (4) Cr

_____45.Which general trend is found in Period 3 as the elements are considered in order of increasing atomic number?

- (1) increasing atomic radius
- (2) increasing electronegativity
- (3) decreasing atomic mass
- (4) decreasing first ionization energy

_____46.The elements in Group 2 are classified as

- (1) Alkaline Earth Metals
- (2) Metalloids
- (3) Alkali Metals
- (4) Noble gases

_____47.As a chlorine atom becomes a negative ion, the atom

- (1) gains an electron and its radius increases
- (2) gains an electron and its radius decreases
- (3) loses an electron and its radius increases
- (4) loses an electron and its radius decreases

_____48.The nucleus of an atom of K-42 contains

- (1)20 protons and 19 neutrons
- (2)23 protons and 19 neutrons
- (3)19 protons and 23 neutrons
- (4)19 protons and 42 neutrons

_____49.Which statement best describes the nucleus of an aluminum atom?

- (1) It has a charge of -13 and is surrounded by a total of 10 electrons.
- (2) It has a charge of -13 and is surrounded by a total of 13 electrons.
- (3) It has a charge of +13 and is surrounded by a total of 10 electrons.
- (4) It has a charge of +13 and is surrounded by a total of 13 electrons.

_____50.Which list consists of elements that have the most similar chemical properties?

- (1)Mg, Ca, and Ba
- (2)K, Al, and Ni
- (3)K, Ca, and Ga
- (4)Mg, Al, and Si

_____51.What occurs in order to break the bond in a Cl₂ molecule?

- (1) Energy is absorbed.
- (2) Energy is released.
- (3) The molecule creates energy.
- (4) The molecule destroys energy.

_____52.Which two elements have the most similar chemical properties?

- (1)Be and Mg
- (2)Cl and Ar
- (3)Na and P
- (4)Ca and Br

_____53.Which quantity identifies an element?

- (1) atomic number
- (2) mass number
- (3) total number of neutrons in an atom of the element
- (4) total number of valence electrons in an atom of the element

_____54.Chlorine-37 can be represented as

- | | |
|---------------------------|---------------------------|
| (1) $^{17}_{35}\text{Cl}$ | (3) $^{35}_{20}\text{Cl}$ |
| (2) $^{20}_{37}\text{Cl}$ | (4) $^{37}_{17}\text{Cl}$ |

_____55.In a nonpolar covalent bond, electrons are:

- (1) Located in a mobile “sea” shared by many ions
- (2) Transferred from one atom to another
- (3) Shared equally by two atoms
- (4) Shared unequally by two atoms

_____56.What is the total number of neutrons in an atom of Cl-37

- (1) 17
- (2) 37
- (3) 20
- (4) -17

Unit 1:

- 1. Waft
- 2. Observations
- 3. Qualitative observation
- 4. Quantitative observation
- 5. Inference
- 6. Scientific Questions
- 7. Independent Variable
- 8. Dependent Variable
- 9. Hypothesis
- 10. Trend
- 11. Scientific Notation

Unit 1:

- 12. Length
- 13. Mass
- 14. Volume
- 15. Meniscus
- 16. Significant Figures
- 17. Density
- 18. Buoyancy
- 19. Precision
- 20. Accuracy
- 21. Percent Error

Unit 2:

- 1. Matter
- 2. Physical Property
- 3. Malleable
- 4. Chemical Property
- 5. Extensive Property
- 6. Intensive Property
- 7. Physical Change
- 8. Chemical Change
- 9. Melting Point
- 10. Freezing Point
- 11. Boiling
- 12. Vaporization
- 13. Evaporation
- 14. Freezing

15. Condensation
16. Melting
17. Fusion
18. Sublimation
19. Deposition
20. Solid
21. Liquid
22. Gas
23. Heat of vaporization
24. Heat of fusion
25. Temperature
26. Kinetic energy
27. Potential energy
28. Heat
29. Heat capacity
30. Heating/cooling curve
31. Phase
32. Heating curve
33. Cooling curve
34. Colligative property

Unit 3:

1. Atom
2. Element
3. Compound
4. Pure Substance
5. Mixture
6. Homogenous Mixture
7. Heterogeneous Mixture
8. Chemical Formula
9. Subscript
10. Dalton
11. Thomson
12. Cathode Ray Tube
13. Plum Pudding Model
14. Electron
15. Rutherford
16. Gold-Foil Experiment
17. Proton
18. Nucleus
19. Neutron
20. Atomic Mass Unit
21. Atomic Number
22. Mass Number
23. Average Atomic Mass
24. Isotope
25. Percent Abundance
26. Isotopic Notation
27. Ions

Unit 4:

1. Bright Line Spectra
2. Photon
3. Ground State Electron Configuration
4. Excited State Electron Configuration
5. Valence Electrons
6. Lewis Dot Diagram
7. Group on the periodic table
8. Period on the periodic table
9. Families on the periodic table
10. Alkali Metals
11. Alkaline Earth Metals
12. Halogens
13. Noble Gases
14. Metal
15. Nonmetal
16. Metalloid
17. Ionization Energy
18. Electronegativity
19. Atomic Radius
20. Reactivity of elements
21. Ionic Radius
22. Cation
23. Anion

Unit 5:

1. Chemical bond
2. Octet rule
3. Oxidation number
4. Polyatomic ion
5. Ionic compound
6. Covalent compound
7. Ionic bond
8. Covalent compound
9. Polar covalent
10. Non-polar covalent
11. Polar
12. Dipole
13. Metallic bond
14. Intermolecular forces
15. Hydrogen bonds
16. Dipole-dipole forces
17. London dispersion forces
18. Electrolyte

Unit 6:

1. Grams formula mass
2. Molecular formula
3. Empirical formula
4. Subscript
5. Coefficient
6. Percent composition
7. Law of conservation of mass
8. Mole
9. Avogadro's number
10. Synthesis
11. Decomposition
12. Single replacement
13. Double replacement
14. Combustion
15. Activity Series
16. Products
17. Reactants