Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_

**Study Guide: Semester 1 Final Exam**

**Unit 1: Matter**

**Define Significant figures:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write the number of significant figures: Round (5-8):

1. 85.83 5) 98.22 to 2 sig figs
2. 5000 6) 5012 to 1 sig fig
3. 30.0 7) 30.0825 to 3 sig figs
4. 321.22 8) 325 to 2 sig figs

Calculate the correct number of significant figures for the following multiplication and division problems

9) 35.8 x 12.45 = 10) 100. / 32.751=
11) 13.75 x 500 = 12) 25/75.50 =



13) Determine how many sig figs can be measured in each of the devices below:



a) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ b) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ c) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Beaker Graduated Cylinder Buret**

14) Which of the measuring devices above is most precise? Why?

States of matter and phase changes

1. Draw motion of the atoms for the three states of matter and describe characteristics of each (particle motion, volume, shape etc.)

Gas

Liquid



Solid

1. Write the phase changes between solid liquids and gases.

3) Which of the phase changes are exothermic? How do you know?

4) Which phase change requires the greatest increase in particle

 energy?

Solids

Gas

Liquid

**Unit 2: Energy and Heat**

Define Specific Heat: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Rank the substances to the left that will heat up the fastest (1) to the slowest (8)

|  |  |
| --- | --- |
| **Table 2: Specific Heat Capacity of Building Materials** |  |
| **Material** | **J/(g°C)** | **Rank** |
| Asphalt | 0.920 |  |
| Brick | 0.840 |  |
| Concrete | 0.880 |  |
| Glass | 0.840 |  |
| Granite | 0.790 |  |
| Gypsum | 1.090 |  |
| Wood | 1.700 |  |
| Water | 4.180 |  |

1. How do you know these rankings?
2. In the equations above what do EACH of the variables represent?

Q=

C=

m=

|  |
| --- |
| **Specific Heat: Equations** |
| Q=C⏺m⏺ΔTC=Q/ m⏺ΔT | m= Q/ C⏺ΔTΔT=Q/ C⏺m |

ΔT=

1. A 22.5 g sample of brick was heated from 75.0 oC to 95.0 oC how much energy was required to heat the sample. Is this reaction endothermic or exothermic? Explain your reasoning.

1. A sample of asphalt is cooled from 25 oC to 0 oC releasing 950 J of energy what is the mass of the sample? Is this reaction endothermic or exothermic? Explain your reasoning.

1. A 56g sample of concrete absorbed 2450 J of heat. What was the temperature required to absorb this energy?
2. A 15g sample of glass was cooled from 56 oC to an unknown temperature releasing 75 J of energy what was the final temperature of the glass. **(honors only)**



8) Label the following parts to the phase diagram above: **solid, liquid, gas, triple point**.

9) Label where the following phase changes would occur on the graph above:

a. Freezing/Melting

b. Vaporization/Condensation

c. Sublimation/Deposition

**Unit 3: atomic structure**

Structure of the atom

|  |  |  |  |
| --- | --- | --- | --- |
| **Part of the atom** | **Location** | **Charge** | **Mass** |
| Proton |  |  |  |
| Neutron |  |  |  |
| Electron |  |  |  |

1. Define Nucleus: 2) Define Electron cloud:
2. Label the Picture:

**4) What subatomic particle determines the identity of an atom?**

1. Fill in the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name of Atom** | **# protons** | **# electrons** | **# neutrons** | **atomic mass** |
|  |  | 34 |  |  |
|  | 15 |  |  |  |
| Bromine |  |  |  |  |
|  |  |  | 28 | 40 |

1. Draw the correct Bohr model the following elements, including the number of protons and neutrons for each.

 Nitrogen-14 Chlorine-35 Neon-20

1. Do electrons actually orbit the nucleus in the same way the earth orbits the sun like a Bohr model shows?
2. Define isotope:
3. In each of the following examples circle the two elements that are isotopes of each other
	1. $$ $$ $$
	2. $Cl^{-1}$ $$ $$
4. Explain why $$ and $$ are isotopes of each other use specific numbers and terms.
5. Convert the following:
	1. 35.5 grams of NaCl to moles:
	2. 20.15 grams of Copper (II) nitrate to moles: (**HONORS**)
	3. 1.58 x 1024 atoms of Neon to moles:
	4. 14 grams of potassium chloride to atoms:

**Unit 4: Periodic table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Family/Group Number** | **Family/Group Name** | **# of valence electrons** | **Elements** |
| Halogens |  |  |  |
|  | 1A |  |  |
|  |  | 8 |  |
|  |  |  | Magnesium, Strontium, Barium |

Electron Configuration

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Electron Configuration** | **1s** | **2s** | **2p** | **3s** | **3p** | **4s** |
| **Mg** | 1s22s22p63s2 |  |  |  |  |  |  |  |  |  |  |
| **Cl** | 1s22s22p63s23p5 |  |  |  |  |  |  |  |  |  |  |
| **Si** | 1s22s22p63s23p2 |  |  |  |  |  |  |  |  |  |  |

1. Write the complete electron configuration for the *ground state* of each atom below.
2. Lithium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Phosphorous: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**:**

1. Calcium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Gallium: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Noble gas configuration for Gallium **(honors only):** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Use the table below to explain the difference between the electron configurations for the Co2+ and Co3+ ions of Cobalt? **(honors only)**

|  |  |  |
| --- | --- | --- |
|  | **Noble Gas Electron Configuration** | **Explanation** |
| Co |  |  |
| Co2+ |  |  |
| Co3+ |  |  |

Periodic Trends

1. What is Columbic attraction and what causes Columbic attraction to change?
2. Fill in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Periodic Trend | Definition | Increases or decreases ACROSS A PERIOD? **Why?** | Increases or decreases DOWN A GROUP? **Why?** |
| Atomic Size |  |  |  |
| Electronegativity |  |  |  |
| Ionization Energy |  |  |  |

1. Place fluorine (F), Bromine (Br), Calcium (Ca), and Barium (Ba) in order of INCREASING electronegativity.
2. Place fluorine (F), Bromine (Br), Calcium (Ca), and Barium (Ba) in order of INCREASING atomic size.
3. Place fluorine (F), Bromine (Br), Calcium (Ca), and Barium (Ba) in order of DECREASING ionization energy.

\*\*LOOK OVER YOUR TRENDS GRAPHS AND BE PREPARED TO ANSWER SKILLS QUESTIONS SIMILAR TO THE ONES IN YOUR PACKET!!!

**Unit 5: Bonding**

1. What is an ion and how does it form?
2. Fill in the table below.

|  |  |  |
| --- | --- | --- |
| **Ion** | **Charge** | **Explanation** |
| Magnesium |  |  |
| Oxygen |  |  |
| Phosphorous |  |  |
| Gallium |  |  |

1. Why do ions form? How many valence electrons do ions have?

Ionic Bonding

1. How does an ionic bond form?
2. Fill in the table below.

|  |  |  |
| --- | --- | --- |
| **Atoms** | **Ionic?** | **Formula** |
| Silicon and Chlorine |  |  |
| Gallium and Sulfur |  |  |
| Beryllium and Chlorine |  |  |

1. Fill in the table below. **(BE CAREFUL OF THE TYPE II METALS and POLYATOMIC IONS)**

|  |  |  |
| --- | --- | --- |
| **Formula** | **Name** | **Lewis Dot Diagram** |
|  | **Aluminum Oxide** |  |
| **Na2S** |  |  |
|  | **Lead (IV) Oxide** |  |
| **Fe2S3** |  |  |
| **Mg3(PO4)2** |  |  |
| **NH4NO2** |  |  |
|  | **Iron (III) Chloride** |  |
|  | **Calcium Phosphate** |  |
| **Ni(NO3)2** |  |  |