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**Exam Study Guide – Physical Science – Chemistry Semester**

**Unit 6 – Properties of Matter**

**Terms to know:**

Matter Element Chemical change Physical change  
Solvent Solute Heterogeneous mixture Homogeneous mixture  
Colloid Gel Aerosol Emulsion  
Pure substance Mixture Compound Solubility

1. What does all matter contain?
2. Draw a picture showing the arrangement of atoms in each of the four states of matter below.

**Solid Liquid Gas Plasma**

1. Add to your pictures above, what it is called as you switch between the different states of matter (for example solid->liquid = melting)
2. What is the difference between a chemical change and a physical change? Include some examples of each.
3. Define the following:
   1. Element –
   2. Compound –
   3. Mixture –
4. What is the difference between a homogenous mixture and a heterogeneous mixture?

1. Fill in the chart below about the different types of colloids:

|  |  |  |
| --- | --- | --- |
| **Colloid** | **Describe what it is made out of** | **Examples** |
| Aerosol |  |  |
| Emulsion |  |  |
| Gel |  |  |

1. When talking about solutions we can describe them based on the amount of solute to solvent they have, describe the following:
   1. Unsaturated Solution -
   2. Saturated Solution -
   3. Supersaturated Solution -

Hint: I might revisit the solubility graph practice we did during this unit, see your notebook.

**Unit 7 – Atomic Theory and the Periodic Table**

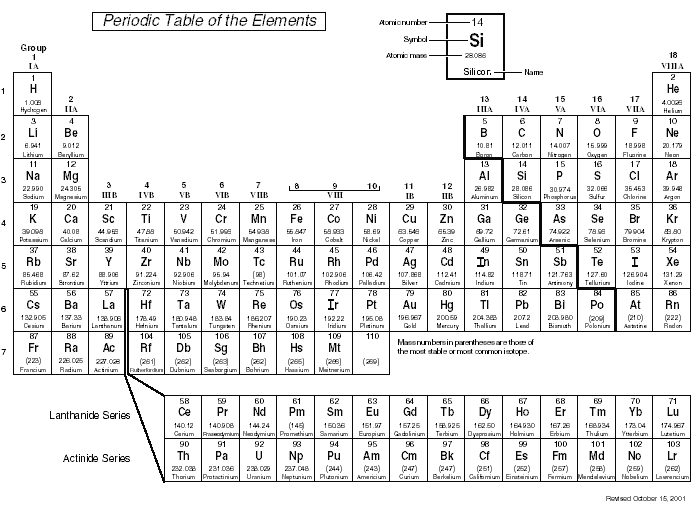
**Terms to know:**

Atom Proton Neutron Electron   
Subatomic particles Nucleus Malleable Ductile  
Energy level Valence electron Ion Isotope  
Semiconductor Atomic mass Atomic number Symbol

1. What are the two parts of an atom? What is found in each part? Which part occupies the majority of the space? Which part contains the majority of the mass?
2. In addition to knowing where they are (in the previous question), what are the charges of the following subatomic particles?
   1. Protons –
   2. Neutrons –
   3. Electrons –
3. What does the atomic mass of an element represent?
4. What is different about isotopes of the same element?
5. What are ions?
6. Fill out the following chart practicing how to figure out subatomic particles and basics about elements:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Symbol** | **Atomic Number** | **Atomic Mass** | **Protons** | **Neutrons** | **Electrons** |
| Boron |  |  |  |  |  |  |
| Calcium |  |  |  |  |  |  |
| Gold |  |  |  |  |  |  |
| Argon |  |  |  |  |  |  |
| C-14 |  |  |  |  |  |  |
| C-12 |  |  |  |  |  |  |
| O-16 |  |  |  |  |  |  |
| O-18 |  |  |  |  |  |  |
| Li 1+ |  |  |  |  |  |  |
| O2- |  |  |  |  |  |  |
| Mg2+ |  |  |  |  |  |  |

1. What are valence electrons?
2. When thinking about Bohr models, how many electrons fit in each energy level?
3. How many valence electrons would the following elements have?
   1. Oxygen –
   2. Carbon –
   3. Magnesium –
4. If an ion has a positive charge what does that mean? What if it has a negative charge?
5. Who organized the periodic table?
6. On the table below, label the following: alkali metals, alkaline earth metals, transition metals, metalloids, non-metals, halogens, noble gases

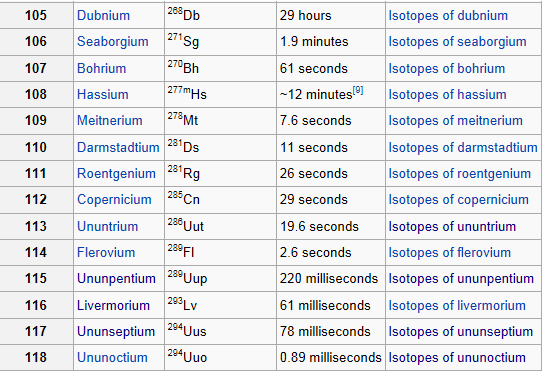


1. What makes noble gases so unique?
2. Describe the basic properties of the following:
   1. Metals –
   2. Non-metals –
   3. Metalloids –
3. Metals have several unique properties, describe the following:
   1. Ductile –
   2. Malleable –
   3. Conductive –

**Unit 8 - Radioactivity**

**Terms to know:**

Fusion Fission Geiger counter Radiation

1. Describe the difference in strength between the following types of radiation:
   1. Alpha radiation –
   2. Beta radiation –
   3. Gamma radiation –
2. Create a chart below comparing and contrasting fusion and fission.
3. When dealing with nuclear power plants, what are some ways we control the rate of reaction/prevent meltdowns?
4. What is a half life?
5. Carbon-14 has a half life of 5,730 years. Supposed you had a fossil with 75% of its original C-14 already decayed, how old would you suspect the fossil is?
6. Use the chart below to answer the following questions:
   1.  If I start with 10 grams of Bh-270, how much would I have left after 183 seconds?
   2. Which element would have 87.5% of its sample decay in 7.8 seconds?
   3. If I have Db-268 and only 25% of it remains undecayed, how many half lives have happened? How long would this have taken?

1. What does it mean for an atom to be stable?

**Unit 9A – Compounds, Naming and Bonding**

**Terms to know:**

Ions Ionic Bond Covalent Bond Product  
Reactant Formula Mass Atomic Mass Percent Composition

1. Answer the following based on the equation below:

6CO2 + 6H2O 🡪 C6H12O6 + 6O2

* 1. What are the reactants?
  2. What are the products?
  3. How many hydrogen atoms are on the reactants side?
  4. How many hydrogen atoms are on the products side?

1. Answer the following based off of the formula below:  
    NH3
   1. How many atoms of each element are there?
   2. What is the molecular mass (formula mass)?
   3. What is the percent composition of hydrogen?
2. Answer the following based off of the formula below:  
    H2SO4
   1. How many atoms of each element are there?
   2. What is the molecular mass (formula mass)?
   3. What is the percent composition of hydrogen?
3. What is the difference between an ionic bond and a covalent bond?

1. What formula would the following ions create? (hint: think boogie method)
   1. Ag+1NO3 -1
   2. Na+1Cl -1
   3. Ca +2 Cl-1
   4. Sn +4 N-3
2. Name the following formulas, keep in mind there are different naming rules for ionic and covalent compounds (hint this is something you may want to write on your notecard)
   1. BaCl2
   2. K2S
   3. SO2
   4. MgO
   5. NaF
   6. P4S5
   7. SeF6
3. Given the following names, write the formulas (again these are a mix of ionic and covalent, keep in mind with ionic you may need to balance out charges… covalent will tell you subscripts in the name)
   1. Iodine pentafluoride
   2. Copper (II) chloride
   3. Lithium oxide
   4. Dinitrogen trioxide
   5. Phosphorus triiodide
   6. Barium fluoride
   7. Lithium acetate

**Unit 9B – Reactions and Stoichiometery**

**Terms to know:**

Products Reactants Synthesis Decomposition  
Single Replacement Double Replacement Exothermic Endothermic  
Moles Molecules Mass Avogadro

1. Describe the following reactions in basic terms using letters (first one is done for you)
   1. Synthesis – A +B 🡪 AB
   2. Decomposition –
   3. Single Replacement –
   4. Double Replacement –
2. Identify the following reactions as one of the types you defined in #1 above:
   1. CH4 + Cl -----> CH3Cl + HCl
   2. 3Fe + 2O2 ------> Fe3O4
   3. Zn(OH)2 + 2HCl ------> ZnCl2 + 2H2O
   4. H2O 🡪 H2 + O
3. Balance the following equations

\_\_\_Mg + \_\_\_N2 🡪 \_\_\_Mg3N2

\_\_\_N2 + \_\_\_O2 🡪 \_\_\_NO2

\_\_\_HgO 🡪 \_\_\_Hg + \_\_\_O2

\_\_\_Cu + \_\_\_S 🡪 \_\_\_Cu2S

\_\_\_NO2 🡪 \_\_\_N2 + \_\_\_O2

\_\_\_Fe + \_\_\_O2 🡪 \_\_\_Fe2O3

\_\_\_H2O 🡪 \_\_\_H2 + \_\_\_O2

\_\_\_NH3 🡪 \_\_\_N2 + \_\_\_H2

1. How many moles are in 10 grams of Beryllium?
2. How many grams are in 5 moles of Nitrogen?
3. How many moles are in 25 grams of AgNO3?
4. How many grams are in 3 moles of Cr2O­3?
5. How many molecules are in 5 grams of water (H2O)?
6. How many grams are in 2.5 x1024 molecules of water (H2O)?
7. Contrast exothermic and endothermic reactions below using a chart, include a sketch of what a graph of each looks like.

**Unit 9C – Organic Chemistry**

**Terms to know:**

Organic Hydrocarbon Alkane Alkene   
Alkyne Isomer Functional Group

1. What makes carbon so special when it comes to bonding?
2. What is a basic property of all hydrocarbons?
3. What is the difference between an alkane, alkene and alkyne?
4. Name the following:
   1. CH3 – CH2 - CH2­ - CH3
   2. CH3 – CH2 - CH2­ - CH2­ - CH2­ - CH2­ - CH3
   3. C=C-C-C-C-C
   4. C=C-C
   5. CH4
5. What are isomers?
6. What are functional groups?

**Unit 10 – Acids and Bases**

**Terms to know:**

Acid Base pH scale Neutralization  
Indicator Litmus paper Acid Rain pH

1. Create a chart below comparing acids and bases.
2. What is the pH of a solution with a H+ concentration of 1.0 x 10-5 M?
3. Is a solution with a H+ concentration of 11.2 x 10-10 M acidic, basic or neutral?
4. What is the concentration of 4 moles of HCl in 2 L of water?
5. What is the concentration of 2.5 moles of HCL in 4000 ml of water?
6. How much 0.5 M HCl solution can be made by diluting 2L of 12 M HCl?