

## Student Review

### Chemistry Semester A 2009 Examination

#### Test Description

Length: 2 hours

Points: 65 SR (1 pt each), 4 BCRs (4 pts each), Total pts = 81

Unit	Approximate Number of Selected Response Items		Approximate Number of Constructed Response Items
	<i>On Level</i>	<i>Honors</i>	
Chemistry Skills and Processes	12	11	1
Classification of Matter	6	7	
Formula Writing	10	10	
Reactions	13	13	1
Stoichiometry	8	9	1
Atomic Structure	12	11	
Periodicity	4	4	1
<b>Totals</b>	<b>65</b>	<b>65</b>	<b>4</b>

The vocabulary terms and objectives are grouped into units for your convenience. Some items may occur in multiple units during the semester. The vocabulary includes terms that students may encounter when reading examination items. (H) indicates items found on the Honors Chemistry examination but not on the Chemistry examination.

#### Some Vocabulary For the Exam

##### *Classification of Matter*

alloy  
chemical change  
classification  
colloid  
combustion  
composition  
compound  
conductivity  
conservation of mass  
density  
dissolving  
distillation  
element  
filtration  
flammability  
heterogeneous  
homogenous  
insoluble  
laser  
malleable  
mixture

physical change  
pressure  
property  
pure substance  
soluble  
solution  
suspension  
Tyndall Effect  
uniform  
volume

***Formulas***  
acids  
alkane  
binary ionic compound  
bond  
chemical formula  
chemical name  
diatomic  
covalent compound  
compound

formula unit  
formula mass  
hydrocarbon  
inorganic  
ionic bond  
ionic covalent bond  
(molecular compound)  
ion/ionic  
molecular/molecule  
monatomic ion  
polyatomic ion  
solute  
solvent  
organic  
tertiary  
subscript

##### ***Reactions***

activity series  
bond  
catalyst

## Student Review

### ***Reactions (continued)***

chemical reaction  
chemical equation  
coefficient  
combustion  
decomposition  
single displacement  
double displacement  
dissociation  
electrolysis  
hydrocarbon  
insoluble  
ionization  
net ionic equation (H)  
percent yield (H)  
precipitate  
product  
reactant  
soluble  
subscript  
synthesis

### ***Stoichiometry***

Avogadro's number  
excess

limiting reactant  
molar mass  
mole  
mole ratio  
percent composition

### ***Atomic Structure***

alpha particles  
anion  
atom  
average atomic mass  
atomic number  
Bohr  
cation  
charge  
electron  
electron configuration  
energy level  
excited state  
ground state  
ion  
isotope  
neutron  
nucleus  
orbital

percent abundance (H)  
proton  
valence electrons

### ***Periodicity***

actinide series  
atomic radius  
alkali metal  
alkaline earth metal  
electronegativity  
family  
group  
halogen  
ionization energy  
lanthanide series  
melting point  
metallic character  
noble gas  
oxidation number  
period  
periodic law  
precipitate  
thermal conductivity  
transition metal  
trend  
valence electrons

**Upon successful completion of the first semester the student should be able to:**

### **Chemistry Skills and Processes**

- interpret graphs and diagrams.
- identify trends revealed by data.
- analyze data to form conclusions.
- defend the need for verifiable data.
- identify the control in an experiment.
- read and interpret a technical passage.
- identify the hypothesis of an experiment.
- identify meaningful, answerable, scientific questions.
- identify appropriate methods for conducting an investigation.
- use ratio and proportion in appropriate situations to solve problems.
- distinguish between a dependent variable and an independent variable.
- describe similarities and differences when explaining concepts and/or principles.
- identify the appropriate instruments and materials needed to conduct an experiment.
- recognize safe laboratory procedures.
- organize data using appropriate techniques.
- compare measurements in scientific notation.

## Student Review

### Classification of Matter

- classify elements as metals, nonmetals and metalloids based on common physical and chemical properties and position on periodic table.
- compare solutions to suspensions and colloids.
- differentiate among elements, compounds, mixtures and solutions.
- distinguish between physical and chemical changes.

### Formula Writing

- determine the number and types of atoms represented by a given formula.
- write names and formulas for ionic and molecular compounds including binary compounds, polyatomic ions and common acids and bases, when given the name, periodic table and ion chart.
- identify traditional nomenclature (-ic and -ous suffixes). (H)
- name straight chain organic compounds (alkanes through decane).
- write symbols to represent elements, including diatomic elements, given a periodic table.

### Reactions

- transpose word equations into symbolic chemical equations and vice versa.
- use the activity series to determine if single displacement reactions will occur.
- use solubility rules to predict if a precipitate will form in a double displacement reaction.
- use coefficients to balance simple chemical equations.
- apply the Law of Conservation of Mass to account for the same number of atoms of each type appearing in both the reactants and products.
- identify or describe synthesis, decomposition single displacement, double displacement and combustion reactions given balanced formula equation or written description.
- explain the meaning of coefficients in chemical equations.
- write net ionic equations. (H)

### Stoichiometry

- define the mole in terms of Avogadro's number.
- explain the relationship between moles, mass and particles.
- utilize dimensional analysis to convert between moles and mass and mass and particles.
- calculate the formula mass of a compound using the periodic table.
- calculate the mass percent composition of a compound given the formula, formula mass and periodic table.
- demonstrate that adjusting quantities of reactants may affect the amounts of products formed.
- use the coefficients of a balanced equation to predict amounts of reactants and products at the molecular and mole level.
- use the coefficients of a balanced equation to predict the mass of products formed by a specified mass of a reactant. (H)
- manipulate the limiting reagent concept qualitatively.

## Student Review

### Atomic Structure

- describe the characteristics of protons, neutrons and electrons in terms of location, charge and mass.
- illustrate the structure of the atom by using the Bohr model, including the charge, relative mass and location of the sub-atomic particles.
- use atomic mass, atomic number, and charge to identify neutral atoms, ions, and isotopes.
- analyze the structure of the atom and describe the characteristics of the particles found there.
- describe electron configurations for the first twenty elements.
- describe electron configurations for all elements and justify exceptions. (H)
- distinguish between the nucleus and electron cloud.
- identify the atomic number and average atomic mass given the periodic table.
- identify isotopes of an element based on number of neutrons and/or atomic mass.
- calculate numbers of protons, neutrons and electrons for atoms given mass and the periodic table.
- write nuclide symbols and names that identify specific isotopes.
- calculate atomic mass and express it in atomic mass units.
- describe the characteristics of a neutral atom.
- compare the characteristics of the neutral atom to its ion.
- calculate an element's average atomic mass. (H)

### Periodicity

- demonstrate that the arrangement and number of electrons and the properties of elements repeat in a periodic manner illustrated by their arrangement in the periodic table.
- use families, periods, and common family names in discussions of periodic trends.
- predict chemical and physical properties based on an element's location on the periodic table.
- classify elements as metals, nonmetals and metalloids based on common physical and chemical properties and position on periodic table.
- determine the number of valence electrons for a specific element, given a periodic table.
- describe how the trends of valence electrons, atomic radius, ionization energy, relative chemical reactivity, and metallic/nonmetallic properties behave in groups 1,2 and 13-18.
- locate groups/families on the periodic table, including groups 1-18, and the Alkali Metals, Alkaline Earth Metals, Transition Metals, Halogens, Noble Gases, Lanthanide Series and Actinide Series.
- describe the properties of the groups/families on the periodic table.
- locate periods 1-7 on the periodic table.

### Useful Website

This document (Student Review Sheet) can be found on the MCPS science website at:  
<http://www.montgomeryschoolsmd.org/curriculum/science/>