Chemistry A Review Sheet
Final Exam

This Final Exam Review can help you prepare for the final exam by giving you an idea of what you need to study, review, and learn. To succeed, you should be thoroughly familiar with the subject matter before you attempt to take the exam.

Materials Needed

You will need to bring a scientific or graphing calculator. The formula sheets at the end of this study guide will be provided during the exam. If you are taking a print exam, you must bring a #2 pencil to complete the exam. You will receive a computer-graded answer sheet when you arrive at the testing center. The proctor will provide scratch paper.

For online Proctorio exams, Download and print the UTHS approved printed materials; these are the only allowable printed materials for the exam. Please note that you will be required to show this scratch paper and your approved calculator to the webcam at the beginning of the exam to verify that you are using authorized materials. See the directions below:

DIRECTIONS

You were instructed to clear your calculator memory on the allowable materials page. If you have not already done so, please clear it at this time. Hold up the cleared memory screen to your web camera and hold it still for five seconds so that your instructor can review the screen.

Next, hold up each page of your UTHS printed scratch paper, graph paper, and formula chart to the webcam. The instructor will need to see the front and back of each page clearly for 5 seconds.

Remember that the UTHS Calculator Policy prohibits the use of certain types of calculators for this exam. For example, calculator s with CAS are NOT allowed.

Exam Structure

You will be allowed **3 hours** to complete this exam. The Chemistry A exam consists of 50 multiple-choice questions worth 2 point each for a total of 100 points. The exam covers a wide variety of topics. To help you study, we have isolated 5 key topics and provided study tips and sample questions for each. You can expect about 10 multiple-choice questions on each of the following unit topics:

Unit Topic 1: Laboratory Safety and Units of Measure
Unit Topic 2: Properties and Changes in Matter
Unit Topic 3: Atomic Structure and Electron Configuration
Unit Topic 4: The Periodic Table and Periodic Trends
Unit Topic 5: Naming, Compounds, and Molecules

Scholastic Honesty

When you arrive at the testing center you will be asked to carefully read the exam rules and sign a statement agreeing to take the exam in accordance with the rules. This is called the Examinee's Certification. The following is a copy of these rules:

Examinee's Certification

This certification must be signed *before* the exam is administered and then returned with the completed examination attached, or credit for the exam will not be given.

Scholastic dishonesty is a serious academic violation that will not be tolerated. Scholastic dishonesty encompasses, but is not limited to:

- copying from another student's work;
- using an unauthorized testing proctor or taking the exam at an unauthorized testing location;
- using materials not authorized by a testing proctor;
- possessing materials that are not authorized by a testing proctor, such as lessons, books, or notes;
- knowingly using or soliciting, in whole or Topic, the contents of an unadministered test;
- collaborating with or seeking aid from another student without authorization during the test;
- substituting for another person, or permitting another person to substitute for oneself, in taking a course test or completing any course-related assignment;
- using, buying, stealing, or transporting some or all of the contents of an unadministered test, test rubric, homework answer, or computer program.

Evidence of scholastic dishonesty will result in a grade of *F* on the examination and an *F* in the course (if applicable).

At the testing center, you will be asked to sign a statement that says
you have read the above and agree to complete the examination with scholastic honesty.

Preparing for the exam

Be aware that the Final Exam covers a full semester's worth of work; be prepared to devote an adequate amount of study and preparation time so that you are ready to take the exam.

Part of your preparation for this exam depends on the work you have done throughout the course. As you worked through each unit of the course, you should have

- completed all Lessons;
- completed all Labs and answered conclusion questions;
- completed all Guided Practice questions;
- completed all Practice Quizzes
- completed all Graded Quizzes; and,
- reviewed the materials in the Resource Center.

Additional Study Tips

The following information provides direction for your studies. For each part, you will find study tips and sample questions to give you a general idea of the types of questions you can expect to see on the exam.

Unit Topic 1: Laboratory Safety and Units of Measure

This topic relates to your knowledge of safe lab practices, how to effectively use lab equipment, and how to properly test hypotheses and theories using the scientific method.

Study Tips for Unit Topic 1:

This topic relates to Unit 1. Familiarize yourself with those Unit Objectives, and then be prepared to demonstrate knowledge of the following topics:

- Laboratory safety practices
- Laboratory hazards, hazard symbols, and MSDS interpretation
- Scientific methods, hypotheses, theories, and conclusions
- Accuracy and Precision and accuracy of glassware or equipment
- Significant figures and calculations with significant figures
- Dimensional analysis and conversions using dimensional analysis

Sample Questions for Topic 1:
The following are sample questions. You can find the correct answers listed at the end of this review sheet, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

1. Which of the following would be an accurate measurement and unit of the yellow liquid in this graduated burette?

A. 19.9 L
B. 20 mL
C. 20.1 g
D. 20.01 mL

2. If a student wants to measure out 2.0 lbs of water, how many Liters of water will they need to measure?

Conversion Factors
1 kg = 2.21 lbs.
1 g = 1 mL (for water only)

A. 0.90 L
B. 4.4 L
C. 2.2 L
D. 900 L

Unit Topic 2: Properties and Changes in Matter

This topic relates to your knowledge of the three primary states of matter, identifying and classifying properties, and classifying matter as pure substances or mixtures.

Study Tips for Unit Topic 2:
This topic relates to Unit 2. Familiarize yourself with those Unit Objectives, and then be prepared to demonstrate knowledge of the following topics:

- Describe three states of matter and their primary characteristics
- Identify and classify physical and chemical properties and changes
- Classify properties as either intensive or extensive
- Classify matter as either pure substances or mixtures and how they can be separated
- Distinguish between elements and compounds and how they can be separated
- Distinguish between homogeneous and heterogeneous mixtures

Sample Questions for Topic 2:
The following are sample questions. You can find the correct answers listed at the end of this review sheet, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

3. Which of the following is paired incorrectly?

   A. Flammable: Chemical property
   B. Melting Point: Extensive property
   C. Mass: Physical property
   D. Color: Intensive property

4. A substance looks constant throughout and can be separated into different substances by dissolving it in water. This substance would be classified as a(n):

   A. Pure substance
   B. Compound
   C. Heterogeneous Mixture
   D. Homogeneous Mixture

Unit Topic 3: Atomic Structure and Electron Configuration

This topic relates to your knowledge of the structure of atoms, the nucleus, and the electrons that orbit the nucleus.

Study Tips for Unit Topic 3:
This topic relates to Unit 3. Familiarize yourself with those Unit Objectives, and then be prepared to demonstrate knowledge of the following topics:

- Describe atomic Structure of the nucleus, isotopes, and mass number
- Calculate average atomic mass from percent composition of isotopes
- Describe the orbit of electrons around the nucleus in the s, p, d, and f orbitals
- Construct electron configuration for various atoms

- Describe the electromagnetic spectrum, wave structures, and visible light
- Perform wave calculations using wavelength, frequency, and energy

Sample Questions for Topic 3:
The following are sample questions. You can find the correct answers listed at the end of this review sheet, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

5. Which of the following depictions of the electrons in Bromine would be incorrect?

   A. Ion Charge = -1
   B. Valence electrons = 7
   C. Lewis Dot Structure = 
   D. Electron configuration = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$

6. In the 1890s, JJ Thomson used a Cathode ray tube to study the atom. After putting a strong electrical field across atoms of a gas, he noticed that a beam of particles was emitted from the gas. After placing a positively charged plate near the beam, he observed the beam deflect toward the charged plate. Which of the following conclusions best matches with JJ Thomson's experimental observations?

   A. A negative particles was being emitted from the gaseous atoms.
   B. A positive electron was being emitted from the gaseous atoms.
   C. The atom was indivisible and could not be divided by the electrical field.
   D. The negative proton from the center of the atom was being emitted.

Unit Topic 4: The Periodic Table and Periodic Trends

This topic relates to your knowledge of the creation of the periodic table, its development, and the predictions that you can make from it.

Study Tips for Unit Topic 4:
This topic relates to Unit 4. Familiarize yourself with those Unit Objectives, and then be prepared to demonstrate knowledge of the following topics:

- Describe the structure of the Periodic Table and the periods and groups that make it up.
- Explain the role of elemental properties in the formation of the Periodic Table
- Describe the common properties of common Periodic Table families.
- Predict qualitative relationships between elements such as atomic and ionic radius, electronegativity, and ionization energy.
- Explain, using the structure of an atom, why different elements have different properties.

Sample Questions for Topic 4:
The following are sample questions. You can find the correct answers listed at the end of this review sheet, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

7. Consider the elements Sulfur and Chlorine. Which one of the following responses correctly identifies the element with the higher ionization energy and correctly explains why the trend is the way it is.

   A. Sulfur: sulfur has higher ionization energy because it has greater nuclear charge (Z_{eff})
   B. Chlorine: chlorine has higher ionization energy because it has greater nuclear charge (Z_{eff})
   C. Sulfur: sulfur has higher ionization energy because it has greater electron shielding
   D. Chlorine: chlorine has higher ionization energy because it has greater electron shielding

8. A new element is discovered and displays the following properties:
   - -2 charge when bonded in a compound
   - Solid at room temperature
   - Semiconductor
   - Strongly reactive to alkaline earth metals

   Which of the following elements would you predict would be in the same family?

   A. Argon
   B. Zinc
   C. Sulfur
   D. Fluorine

Unit Topic 5: Naming, Compounds, and Molecules

This topic relates to your knowledge of representing compounds through names and formulas, comparing different types of compounds, and describing the shapes of molecules.

Study Tips for Unit Topic 5:
This topic relates to Unit 5. Familiarize yourself with those Unit Objectives, and then be prepared to demonstrate knowledge of the following topics:

- Generating chemical names for compounds that are ionic, covalent, or acidic.
- Generating chemical formulas from names of compounds that are ionic, covalent, or acidic.
- Compare and contrast properties of substances that display ionic bonding, covalent bonding, or metallic bonding.
- Generate Lewis Dot Structures for ionic and covalent compounds based on the formula.
- Predict the molecular shape of covalent compounds from the Lewis Dot Structure.

Sample Questions for Topic 5:
The following are sample questions. You can find the correct answers listed at the end of this review sheet, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

9. Which of the following name and formula combinations is paired incorrectly?

   A. Hydrosulfuric acid: H_2S
   B. Calcium chloride: $CaCl_2$
   C. Carbon monoxide: CO
   D. Iron (III) bromide: Fe_3Br

10. Which of the following compounds and molecule shapes is correctly paired?

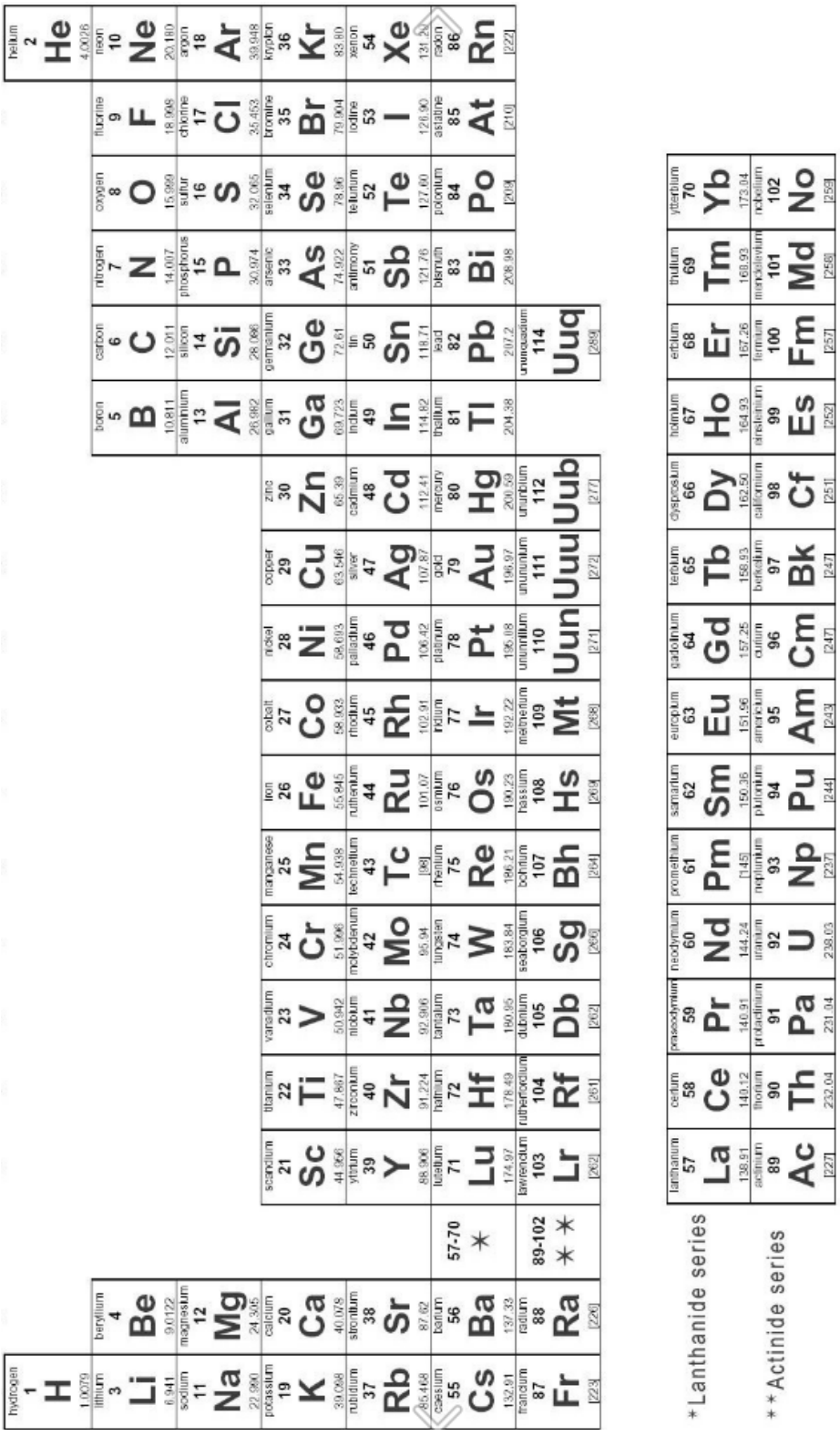
   A. CH_2O: Trigonal Planar
   B. CO_2: Bent
   C. H_2O: Linear
   D. NH_3: Bent

Answer Key

Item Number	Correct Answer	TEKS expectation
1	D	2E, 2F
2	A	2G
3	B	4A, 4B
4	D	4D
5	C	6D
6	A	3F, 6A
7	B	5C
8	C	5A, 5B
9	D	7A, 7B
10	A	7C, 7E

Reference Materials

Periodic Table



Formula Chart

Solubility Rules for Common Ions	
Ions that are more Soluble	
$C_2H_3O_2^-$; NH_4^+, ClO_3^-; ClO_2^-; CN^-, ClO^-, ClO_4^-; MnO_4^- NO_3^-; NO_2^-	Always Soluble (No exceptions)
Cl^-, Br^-, I^-	Soluble except for compounds with: Ag^+, Pb^{2+}, Hg^{2+}
SO_4^{2-}	Soluble except for compounds with: Sr^{2+}, Pb^{2+}, Ba^{2+}, Hg^{2+}
Ions that are more Insoluble	
CO_3^{2-}, CrO_4^{2-}, $Cr_2O_7^{2-}$, PO_4^{3-}	Insoluble except for compounds with: NH_4^+, and alkali metals cations
OH^-, S^{2-}	Insoluble except for compounds with: NH_4^+, alkali metal cations, Ca^{2+}, Sr^{2+}, and Ba^{2+}

Activity Series	
Lithium	Most active
Potassium	
Calcium	
Sodium	
Magnesium	
Aluminum	
Manganese	
Zinc	
Chromium	
Iron	
Cobalt	
Nickel	
Tin	
Lead	
(Hydrogen)	
Copper	
Silver	
Platinum	
Gold	Least Active

Chemistry Formula Chart

Common Polyatomic Ions	
Acetate	$C_2H_3O_2^-$
Ammonium	NH_4^+
Carbonate	CO_3^{2-}
Chlorate	ClO_3^-
Chlorite	ClO_2^-
Chromate	CrO_4^{2-}
Cyanide	CN^-
Dichromate	$Cr_2O_7^{2-}$
Hydrogen carbonate	HCO_3^-
Hydroxide	OH^-
Hypochlorite	ClO^-
Nitrate	NO_3^-
Nitrite	NO_2^-
Perchlorate	ClO_4^-
Permanganate	MnO_4^-
Phosphate	PO_4^{3-}
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}

Chemistry Formula Chart

Atomic Structure, Electrons, and Light:

$c = f * \lambda$	speed of light = (frequency)(wavelength)
$E = h * f$	Energy = (Planck's Constant)(frequency)
$E = \frac{h*c}{\lambda}$	Energy = $\frac{\text{(Planck's Constant)(speed of light)}}{\text{(wavelength)}}$

Gas Laws:

$P*V = n*R*T$	(Pres.)(Vol.) = (mol)(Ideal Gas Constant)(Temp.)
$P_t = P_1 + P_2 + P_3 + \ldots$	Pressure total = Pressure1 + Pressure2 + Pressure3…
$P_1 * V_1 = P_2 * V_2$	(Pressure1)(Volume1) = (Pressure2)(Volume2)
$\frac{V_1}{T_1} = \frac{V_2}{T_2}$	Volume1/Temp.1 = Volume2/Temp.2
$\frac{P_1}{T_1} = \frac{P_2}{T_2}$	Pressure1/Temp.1 = Pressure2/Temp.2

Solutions:

$M = \frac{mol}{L}$	Molarity = moles/Liters of solution
$M_1 * V_1 = M_2 * V_2$	(Molarity1)(Volume1) = (Molarity2)(Volume2)
$pH = -log[H^+]$	pH = - logarithm (Hydrogen ion concentration)
$K_w = [H^+]*[OH^-]$	Ion constant of H_2O=(Molarity H^+)(Molarity OH^-)

Thermochemistry:

$q = m * c_p * \Delta T$	Heat = (mass)(Specific heat)(Change in Temp.)

$\Delta H_f = \Delta H_{f\,(products)} - \Delta H_{f\,(reactants)}$

Enthalpy of reaction = (Enthalpy of Prod.) – (Enthalpy of Reac.)

Other Useful Formulas:

$D = \frac{m}{v}$ Density = mass/volume

$\%\ yield = \frac{actual\ yield}{theoretical\ yield} * 100$

$\%\ error = \frac{(accepted\ value - experimental\ value)}{accepted\ value} * 100$

Constants and Conversions:

Avagadro's Number	1 mole = 6.02×10^{23} particles
Planck's Constant	$h = 6.63 \times 10^{-34}$ J*s
Speed of Light	$c = 3.00 \times 10^{8}$ m/s
Ionization Constant of Water	$K_w = 1.00 \times 10^{-14}$ $(mol/L)^2$

Standard Temperature and Pressure STP: 0.0 °C & 1.00 atm

Volume of Ideal Gas at STP: 22.4 L/mol

0 °C = 273 K

1 cm^3 = 1 mL = 1 cc

1 atm = 760 mmHg = 101.3 kPa

Ideal Gas Constant = R = 0.0821 L*atm/mol*K

1 calorie (cal) = 4.18 Joules (J)

1000 cal = 1 Cal = 1 kcal

Rules for counting Significant figures:

1. All non-zero digits are always significant
2. Zeros between non-zero digits are always significant
3. Leading zeros are never significant
4. Zeros to the right of non-zero digits are significant if there is a decimal present
5. All digits shown in scientific notation are significant