

Honors Chemistry Final Review

The final will consist of:

100 Multiple choice questions (can cover topics from the entire year)

Free Response questions similar to the back of this packet (only the second semester topics)

You may use a 3"x5" note card on your exam provided the note card is turned in prior to the end of class on the last school day before exams start. There are no exceptions. Even if you are absent, the card needs to be here.

Major topics covered

Chapter 1 Chemistry an Introduction

Theory

Law

Scientific Method

Lab safety

Chapter 2 Measurements and Calculations

Sig figs

Dimensional analysis (field goals)

Metric system

Density

Chapter 3 Matter

Elements

Compounds

Mixture

Homogeneous/heterogeneous

Chapter 4 Chemical Foundations

Subatomic particles

Proton

Neutrons

Electrons

Nucleus

Rutherford

Thomson

Periodic Table

Periodic trends

Metals

Nonmetals

Metalloids

Alkali metals

Alkaline Earth Metals

Transition metals

Halogens

Noble gases

Chapter 5 Nomenclature

Ions

Cations

Anions

Ionic bonding

Polyatomic ions

Naming ionic compounds

Determining ionic formulas

Ionic dissociation

Molar mass

Covalent Naming

Covalent Prefixes

Naming Acids

Chapter 6 Chemical Reactions

Products

Reactants

Energy

Exothermic

Endothermic

Balancing Equations

Chapter 7 Reactions in an aqueous solution

Precipitate

Redox reaction

Combustion Reaction

Single Replacement Reaction

Double Replacement reaction

Synthesis Reaction

Double Replacement Reaction

Net Ionic Equation

Spectator Ions

Acid Base Reactions

Chapter 8 Chemical Composition

Mole

Molar Mass

Mole gram conversion

Mole atom conversion

Chapter 9 Chemical Quantities

Stoichiometry

Limiting reactants

Percent Yield

Mole atom conversion

Chapter 10 Energy

Convection

Conduction

Radiation

Enthalpy

Heat

Temperature

Kinetic energy

Entropy

$$q = n C \Delta T$$

$$q = mc \Delta T$$

$$q = Hn$$

Absolute zero

Chapter 11 Modern Atomic Theory

Bohr

Heisenberg

Orbitals

Energy levels

Electron configuration

Quantum numbers

Chapter 12 Chemical Bonding

Covalent bonding

Electronegativity

Polar Covalent Bond

Nonpolar covalent bond

Determining the type of bond

Lewis dot structures

VSEPR

Shapes of Molecules

Chapter 13 Gases

Boyle's Law

Charles' Law

Avagadro's Law

Gay Lussac's Law

Pressure

Combined Gas Law

Ideal Gas Law

Diffusion

Effusion

Graham's Law of Effusion

Chapter 14 Liquids and Solids

Kinetic Molecular Theory

Solid

Liquid

Gas

Evaporation

Volatility

Phase Changes

Chapter 15 Solutions

Suspensions

Colloids

Tyndall Effect

Solutions

Solute

Solvent

Polarity of solvent (like dissolves like)

Concentration

Molarity

Saturated

Supersaturated

Mole fraction

Molality

Freezing point depression

Boiling point elevation

Chapter 16 Acids and Bases

Acids

Bases

Hydronium

Hydroxide

pH

pOH

Equivalence point

Titration

Dilution

Neutralization

Salts

Chapter 17 Equilibrium

Equilibrium

Le Châtelier's Principle

Shifting of equilibrium

Buffers

Indicators

Acidosis/alkalosis

Equilibrium Expression

K

K_{sp} (solubility)

Chapter 18 Oxidation Reduction

Oxidation

Reduction

Oxidation numbers (states)

Galvanic Cell

Electric potential

Anode

Cathode

Corrosion

Electrolysis

Battery

Chapter 19 Nuclear Chemistry

Radiation

Alpha (α) Radiation

Beta (β) Radiation

Gamma (γ) Radiation

Showing α decay

Showing β decay

Half life

Determining the age using half life

Radiodating of objects

Fission

Fusion

Transmutation

Meltdown

Nuclear Winter

Nuclear Medicine

X Ray

CT Scan

MRI

Chapter 20 & 21 Organic Chemistry and Biochemistry

Naming Organic Compounds (root words)

Alkanes

Alkenes

Alkynes

Cyclic hydrocarbons

Isomers

Ketones

Aldehydes

Alcohols

Carboxylic acids

Polymerization

Polymers

Elastomers

Plastics

Fibers

Petroleum

Proteins

Carbohydrates

Lipids

Nucleic Acids

DNA

RNA

Practice Problems for the Chemistry Final

$$q = n C \Delta T \qquad q = mc \Delta T \qquad q = H n \qquad q_{\text{lost}} = q_{\text{gained}}$$

1. How much heat is required to heat 1.8 mol of aluminum from 250 K to 320 K?

2. If 43 kJ of heat are added to 41 mol of silver at 18° C what will its final temperature be?

This includes a phase change

3. How much heat is required to heat 5.9 moles of solid lead at 592 K to 630K?

4. A solution of vinegar has a $[\text{H}_3\text{O}^+]$ of 1.45×10^{-5} , what is its pH, pOH, and $[\text{OH}^-]$?

5. A solution of milk of magnesia has a pH of 10.6, what is its $[\text{H}_3\text{O}^+]$, $[\text{OH}^-]$, and pOH?

6. A solution of ammonia has a $[\text{OH}^-]$ of 5.87×10^{-4} , what is its $[\text{H}_3\text{O}^+]$, pH, and pOH?
7. If 27 g of HNO_3 are dissolved in 1.2 L, what concentration will the solution be?
8. A water solution of calcium sulfate, CaSO_4 , has a mass percent of 24.0 %, determine its molarity if the solution has a density of 1.12 g/mL.
9. Calculate the molality of a 2.9 M solution of Iron II Nitrate, $\text{Fe}(\text{NO}_3)_2$, in water if the solution has a density of 1.09 g/mL.

10. Find the freezing point of the 1.25 m solution of a water solution of strontium chloride.

11. Show the beta decay C-14

12. Show the alpha decay followed by the beta decay of Ra-230

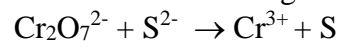
13. Show the alpha decay followed by another alpha decay of W-186

14. Show the beta decay followed by another beta followed by the alpha decay of decay of K-40.

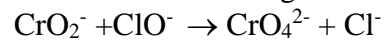
15. If you originally had 125 g of K-40, you now have 32 g left. How much time has passed?

16. If you originally had 37 g of H-3 and you now have 14 g left. How much time has passed?

17. Balance the following in an acid



18. Balance the following in a base



Determine the electric potential and the full redox equation of a cell based on the following

19. Zn/Zn²⁺ & Cu/Cu²⁺

20. K/K⁺ & Sn/Sn²⁺

21. Draw the skeleton structure and give the molecular formula of 4-bromo 3-methyl 1-octyne.

22. Draw the skeleton structure and give the molecular formula for 2, 2 dimethyl 3 chloro 5 bromo 1 cyclohexanol

23. Draw the skeleton structure and give the molecular formula of 2-bromo 3-methyl cyclohexanone.

24. Draw the skeleton structure and give the molecular formula of 3-ethyl 2 methyl hexanoic acid.