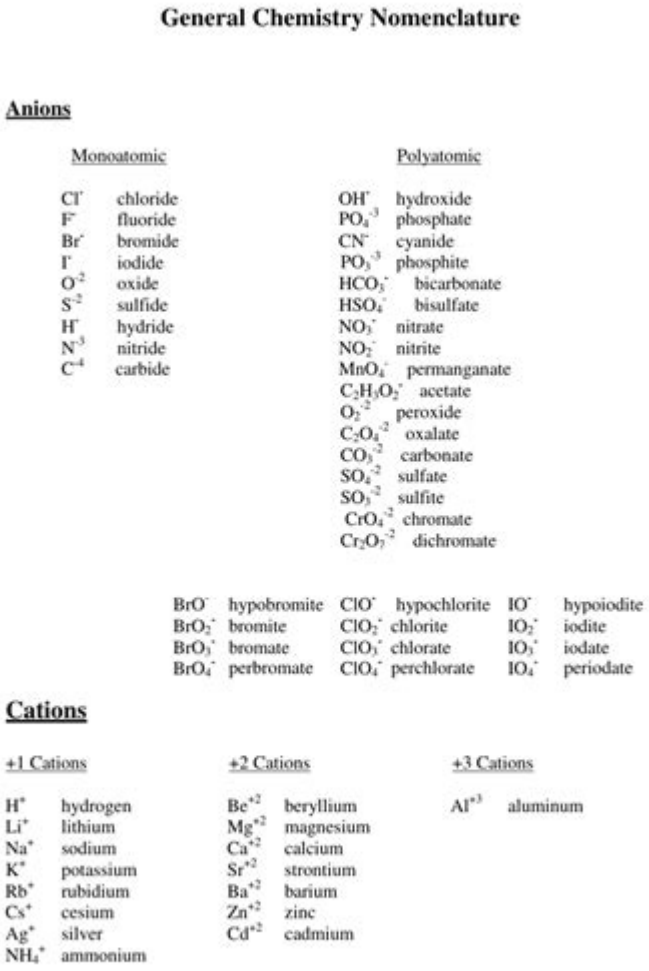
General Chemistry Cheat Sheet



General Chemistry Nomenclature

Anions

Monoatomic		Polyatomic	
Cl^-	chloride	OH^-	hydroxide
F^-	fluoride	PO_4^{-3}	phosphate
Br^-	bromide	CN^-	cyanide
I^-	iodide	PO_3^{-3}	phosphite
O^{-2}	oxide	HCO_3^-	bicarbonate
S^{-2}	sulfide	HSO_4^-	bisulfate
H^-	hydride	NO_3^-	nitrate
N^{-3}	nitride	NO_2^-	nitrite
C^{-4}	carbide	MnO_4^-	permanganate
		$C_2H_3O_2^-$	acetate
		O_2^{-2}	peroxide
		$C_2O_4^{-2}$	oxalate
		CO_3^{-2}	carbonate
		SO_4^{-2}	sulfate
		SO_3^{-2}	sulfite
		CrO_4^{-2}	chromate
		$Cr_2O_7^{-2}$	dichromate

BrO^-	hypobromite	ClO^-	hypochlorite	IO^-	hypoiodite
BrO_2^-	bromite	ClO_2^-	chlorite	IO_2^-	iodite
BrO_3^-	bromate	ClO_3^-	chlorate	IO_3^-	iodate
BrO_4^-	perbromate	ClO_4^-	perchlorate	IO_4^-	periodate

Cations

+1 Cations		+2 Cations		+3 Cations	
H^+	hydrogen	Be^{+2}	beryllium	Al^{+3}	aluminum
Li^+	lithium	Mg^{+2}	magnesium		
Na^+	sodium	Ca^{+2}	calcium		
K^+	potassium	Sr^{+2}	strontium		
Rb^+	rubidium	Ba^{+2}	barium		
Cs^+	cesium	Zn^{+2}	zinc		
Ag^+	silver	Cd^{+2}	cadmium		
NH_4^+	ammonium				

General chemistry cheat sheet is a handy tool for students and professionals alike, providing a concise summary of essential concepts, formulas, and principles in the field of chemistry. This article aims to give you a comprehensive overview of various topics covered in general chemistry, organized into easily digestible sections. Whether you're preparing for an exam, completing homework, or brushing up on your chemistry knowledge, this cheat sheet will serve as an invaluable resource.

1. The Basics of Chemistry

Chemistry, the study of matter and its interactions, is foundational to many scientific disciplines. Understanding the basic concepts is crucial for more advanced studies.

1.1 Matter and Its Properties

Matter is anything that has mass and occupies space. It can be classified into:

- **Elements: Pure substances that cannot be broken down (e.g., hydrogen, oxygen).**
- **Compounds: Substances formed by the chemical combination of two or more elements (e.g., water, carbon dioxide).**
- **Mixtures: A combination of two or more substances that are not chemically bonded (e.g., air, saltwater).**

Properties of matter can be classified into:

- **Physical properties: Characteristics that can be observed without changing the**

substance (e.g., color, boiling point).

- Chemical properties: Characteristics that determine how a substance reacts with other substances (e.g., flammability, reactivity).

1.2 States of Matter

Matter typically exists in three states:

- Solid: Defined shape and volume, particles are tightly packed.
- Liquid: Defined volume but takes the shape of its container, particles are less tightly packed.
- Gas: No defined shape or volume, particles are far apart and move freely.

2. Atomic Structure

The atom is the basic unit of matter. Understanding its structure is vital for grasping chemical principles.

2.1 Components of an Atom

An atom consists of three primary particles:

- **Protons: Positively charged particles found in the nucleus.**
- **Neutrons: Neutral particles, also located in the nucleus.**
- **Electrons: Negatively charged particles that orbit the nucleus.**

The number of protons in an atom defines the element, while the number of neutrons can vary, leading to isotopes.

2.2 Atomic Number and Mass Number

- Atomic Number (Z): The number of protons in an atom, which determines the element's identity.
- Mass Number (A): The total number of protons and neutrons in the nucleus.

3. The Periodic Table

The periodic table organizes elements based on their atomic number and properties.

3.1 Periods and Groups

- Periods: Horizontal rows that indicate the number of electron shells.
- Groups (or Families): Vertical columns that share similar chemical properties due to having the same number of valence electrons.

3.2 Key Trends

Some important trends in the periodic table include:

- **Atomic Radius: Increases down a group and decreases across a period.**
- **Ionization Energy: Energy required to remove an electron, increases across a period and decreases down a group.**
- **Electronegativity: Tendency of an atom to attract electrons, increases across a period and decreases down a group.**

4. Chemical Bonds

Chemical bonds are the forces that hold atoms together, crucial for the formation of compounds.

4.1 Types of Chemical Bonds

- **Ionic Bonds: Formed when electrons are transferred from one atom to another, creating charged ions (e.g., sodium chloride).**

- **Covalent Bonds: Formed when two atoms share electrons (e.g., water, methane).**
- **Metallic Bonds: Formed by the attraction between metal ions and delocalized electrons (e.g., copper, aluminum).**

4.2 Molecular Shapes

The shape of a molecule affects its properties and reactivity. Common shapes include:

- **Tetrahedral: Four bonding pairs, e.g., CH_4.**
- **Linear: Two bonding pairs, e.g., CO_2.**
- **Bent: Two bonding pairs and one or more lone pairs, e.g., H_2O.**

5. Chemical Reactions

Chemical reactions involve the transformation of reactants into products.

5.1 Types of Chemical Reactions

There are several types of chemical reactions:

- **Synthesis: Two or more substances combine to form a single product (A + B → AB).**
- **Decomposition: A single compound breaks down into two or more products (AB → A + B).**
- **Single Replacement: An element replaces another element in a compound (A + BC → AC + B).**
- **Double Replacement: The exchange of ions between two compounds (AB + CD → AC + BD).**
- **Combustion: A substance reacts with oxygen, releasing energy (typically producing CO_2 and H_2O).**

5.2 Balancing Chemical Equations

Balancing chemical equations is essential to obey the law of conservation of mass. Steps to balance an equation include:

1. **Write the unbalanced equation.**
2. **List the number of atoms of each element on both sides.**
3. **Add coefficients to balance the atoms.**
4. **Check the balance by counting the atoms again.**

6. Solutions and Concentration

Solutions are homogeneous mixtures where one substance (solute) is dissolved in another (solvent).

6.1 Types of Solutions

- Saturated Solution: Contains the maximum amount of solute that can be dissolved.
- Unsaturated Solution: Contains less solute than can be dissolved.
- Supersaturated Solution: Contains more solute than can theoretically be dissolved at a given temperature.

6.2 Measuring Concentration

Concentration can be expressed in various ways:

- **Molarity (M): Moles of solute per liter of solution (mol/L).**
- **Molality (m): Moles of solute per kilogram of solvent (mol/kg).**
- **Mass percent: (Mass of solute / Mass of solution) × 100.**

7. Acids, Bases, and pH

Acids and bases are crucial in many chemical reactions and biological processes.

7.1 Properties of Acids and Bases

- **Acids: Sour taste, turn litmus paper red, produce H^+ ions in solution.**
- **Bases: Bitter taste, slippery feel, turn litmus paper blue, produce OH^- ions in solution.**

7.2 pH Scale

The pH scale measures the acidity or basicity of a solution:

- **pH < 7: Acidic solution.**
- **pH = 7: Neutral solution.**
- **pH > 7: Basic solution.**

8. Thermochemistry

Thermochemistry studies the heat changes associated with chemical reactions.

8.1 Laws of Thermodynamics

- First Law: Energy cannot be created or destroyed, only transformed.
- Second Law: The entropy of an isolated system always increases over time.

8.2 Enthalpy (ΔH)

Enthalpy is a measure of heat content in a system. Common reactions involving enthalpy include:

- **Exothermic: Release heat (ΔH < 0).**
- **Endothermic: Absorb heat (ΔH > 0).**

Conclusion

A general chemistry cheat sheet is a valuable tool for anyone studying

Frequently Asked Questions

What is a general chemistry cheat sheet?

A general chemistry cheat sheet is a concise collection of important formulas, concepts, and information that serves as a quick reference for students studying chemistry.

What key topics should be included in a general chemistry cheat sheet?

Essential topics include atomic structure, periodic table trends, chemical bonding, stoichiometry, gas laws, thermodynamics, and basic equations.

How can a cheat sheet help in studying for chemistry exams?

A cheat sheet can streamline study sessions by summarizing crucial information, helping students quickly recall formulas and concepts during exams.

Are there any specific formulas that should be

memorized for general chemistry?

Yes, important formulas include the ideal gas law (PV = nRT), molarity (M = moles of solute/volume of solution), and the equation for calculating pH (pH = -log[H+]).

Can I use a cheat sheet during my chemistry exam?

It depends on the exam rules; some instructors allow a one-page cheat sheet while others do not. Always check the guidelines provided by your instructor.

What is the best way to create an effective chemistry cheat sheet?

Focus on summarizing key concepts, use clear headings, include diagrams or charts for visual aid, and prioritize the most relevant equations and definitions.

How can I organize my cheat sheet for easier understanding?

Organize your cheat sheet by grouping similar topics, using bullet points for clarity, and highlighting or color-coding important information for quick reference.

Is it beneficial to share cheat sheets with classmates?

Yes, sharing cheat sheets can provide different perspectives on how to summarize concepts and might include information you may have missed.

Are there online resources available for chemistry cheat sheets?

Yes, many educational websites offer downloadable chemistry cheat sheets, including Khan Academy, ChemCollective, and various university resource pages.

General Chemistry Cheat Sheet

common，**universal**，**general**，**usual**这几个词在用法上有什么**…**

common，形容词，指常见的。用于形容某种事物很常见，不足为奇，不稀有。后面常接某个具体的事物，如：常见的水果，常见的工具。 **general**，形容词，指普遍的。我们使用 **general** 描 **…**

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