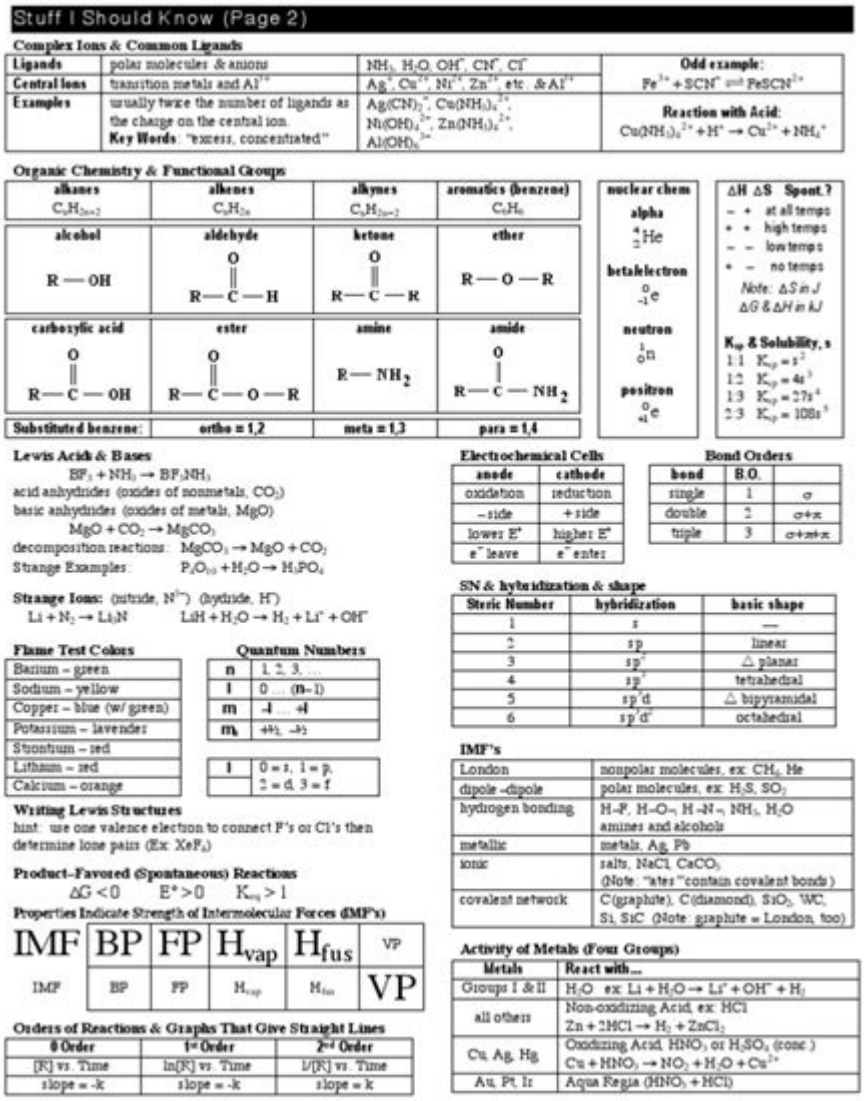
Chemistry Final Cheat Sheet



Stuff I Should Know (Page 2)

Complex Ions & Common Ligands

Ligands	polar molecules & anions	NH_3, H_2O, OH^-, CN^-, Cl^-	**Odd example:** $Fe^{3+} + SCN^- \rightleftharpoons FeSCN^{2+}$
Central Ions	transition metals and Al^{3+}	Ag^+, Cu^{2+}, Ni^{2+}, Zn^{2+}, etc. & Al^{3+}	
Examples	usually twice the number of ligands as the charge on the central ion. **Key Words**: "excess, concentrated"	$Ag(CN)_2^-$, $Cu(NH_3)_4^{2+}$, $Ni(OH)_4^{2-}$, $Zn(NH_3)_4^{2+}$, $Al(OH)_6^{3-}$	**Reaction with Acid:** $Cu(NH_3)_4^{2+} + H^+ \rightarrow Cu^{2+} + NH_4^+$

Organic Chemistry & Functional Groups

alkanes	alkenes	alkynes	aromatics (benzene)
C_nH_{2n+2}	C_nH_{2n}	C_nH_{2n-2}	C_nH_n
alcohol	**aldehyde**	**ketone**	**ether**
R — OH	R—C(=O)—H	R—C(=O)—R	R — O — R
carboxylic acid	**ester**	**amine**	**amide**
R—C(=O)—OH	R—C(=O)—O—R	$R—NH_2$	R—C(=O)—NH_2
Substituted benzene:	**ortho = 1,2**	**meta = 1,3**	**para = 1,4**

nuclear chem

alpha ^4_2He

beta/electron $^0_{-1}e$

neutron ^1_0n

positron $^0_{+1}e$

ΔH ΔS Spont.?

− + at all temps
+ + high temps
− − low temps
+ − no temps

Note: ΔS in J
ΔG & ΔH in kJ

K_{sp} & Solubility, s

1:1 $K_{sp} = s^2$
1:2 $K_{sp} = 4s^3$
1:3 $K_{sp} = 27s^4$
2:3 $K_{sp} = 108s^5$

Lewis Acids & Bases

$BF_3 + NH_3 \rightarrow BF_3NH_3$

acid anhydrides (oxides of nonmetals, CO_2)

basic anhydrides (oxides of metals, MgO)

$MgO + CO_2 \rightarrow MgCO_3$

decomposition reactions: $MgCO_3 \rightarrow MgO + CO_2$

Strange Examples: $P_4O_{10} + H_2O \rightarrow H_3PO_4$

Strange Ions: (nitride, N^{3-}) (hydride, H^-)

$Li + N_2 \rightarrow Li_3N$ $LiH + H_2O \rightarrow H_2 + Li^+ + OH^-$

Flame Test Colors

Barium – green
Sodium – yellow
Copper – blue (w/ green)
Potassium – lavender
Strontium – red
Lithium – red
Calcium – orange

Quantum Numbers

n	1, 2, 3, …
l	0 … (n−1)
m	−l … +l
m_s	$+\frac{1}{2}$, $-\frac{1}{2}$

l	0 = s, 1 = p, 2 = d, 3 = f

Writing Lewis Structures

hint: use one valence electron to connect F's or Cl's then determine lone pairs (Ex: XeF_4)

Product-Favored (Spontaneous) Reactions

$\Delta G < 0$ $E^\circ > 0$ $K_{eq} > 1$

Properties Indicate Strength of Intermolecular Forces (IMF's)

IMF	BP	FP	H_{vap}	H_{fus}	VP
IMF	BP	FP	H_{vap}	H_{fus}	VP

Orders of Reactions & Graphs That Give Straight Lines

0 Order	1st Order	2nd Order
[R] vs. Time	ln[R] vs. Time	1/[R] vs. Time
slope = -k	slope = -k	slope = k

Electrochemical Cells

anode	cathode
oxidation	reduction
− side	+ side
lower E°	higher E°
e^- leave	e^- enter

Bond Orders

bond	B.O.	
single	1	σ
double	2	σ+π
triple	3	σ+π+π

SN & hybridization & shape

Steric Number	hybridization	basic shape
1	s	—
2	sp	linear
3	sp^2	△ planar
4	sp^3	tetrahedral
5	sp^3d	△ bipyramidal
6	sp^3d^2	octahedral

IMF's

London	nonpolar molecules, ex: CH_4, He
dipole –dipole	polar molecules, ex: H_2S, SO_2
hydrogen bonding	H–F, H–O–, H–N–, NH_3, H_2O amines and alcohols
metallic	metals, Ag, Pb
ionic	salts, NaCl, $CaCO_3$ (Note: "ates "contain covalent bonds)
covalent network	C(graphite), C(diamond), SiO_2, WC, Si, SiC (Note: graphite = London, too)

Activity of Metals (Four Groups)

Metals	React with…
Groups I & II	H_2O ex: $Li + H_2O \rightarrow Li^+ + OH^- + H_2$
all others	Non-oxidizing Acid, ex: HCl $Zn + 2HCl \rightarrow H_2 + ZnCl_2$
Cu, Ag, Hg	Oxidizing Acid, HNO_3 or H_2SO_4 (conc.) $Cu + HNO_3 \rightarrow NO_2 + H_2O + Cu^{2+}$
Au, Pt, Ir	Aqua Regia ($HNO_3 + HCl$)

Chemistry final cheat sheet is an essential tool for students preparing for their chemistry exams. A cheat sheet condenses vast amounts of information into a manageable format, making it easier to review key concepts, formulas, and reactions just before the exam. In this article, we will explore how to create an effective chemistry cheat sheet, the critical topics to include, and tips for using it effectively during your study sessions.

Understanding the Purpose of a Chemistry Cheat Sheet

A chemistry final cheat sheet serves several purposes:

1. Summarization: It distills complex information into concise summaries, helping students grasp essential concepts quickly.

2. Review Tool: It is an excellent tool for last-minute reviews, allowing students to refresh their memory on key topics.
3. Memory Aid: The act of creating a cheat sheet reinforces learning by requiring students to process and organize information.

Key Topics to Include in Your Chemistry Final Cheat Sheet

When constructing your cheat sheet, focus on the following critical areas of chemistry:

1. Basic Concepts

- Atoms and Molecules:
- Definition of an atom, element, compound, and mixture.
- Atomic structure: protons, neutrons, and electrons.
- Molecular formulas and empirical formulas.

- Periodic Table:
- Groups and periods.
- Key trends: electronegativity, ionization energy, atomic radius.
- Metals, nonmetals, and metalloids.

2. Chemical Reactions

- Types of Reactions:
- Synthesis (combination) reactions.
- Decomposition reactions.
- Single replacement reactions.
- Double replacement reactions.
- Combustion reactions.

- Balancing Chemical Equations:
- Steps to balance equations.
- Importance of the law of conservation of mass.

- Energy Changes:
- Exothermic vs. endothermic reactions.
- Activation energy and catalysts.

3. Stoichiometry

- Mole Concept:

- Definition of a mole and Avogadro's number.
- Converting between moles, mass, and number of particles.

- Stoichiometric Calculations:
- Using balanced equations to calculate reactants and products.
- Limiting reactants and percent yield.

4. States of Matter

- Phases of Matter:
- Solids, liquids, gases, and plasma.
- Properties of each state.

- Gas Laws:
- Ideal Gas Law: PV=nRT.
- Boyle's law, Charles's law, and Avogadro's law.

5. Solutions and Concentrations

- Types of Solutions:
- Solvent vs. solute.
- Saturated, unsaturated, and supersaturated solutions.

- Concentration Calculations:
- Molarity (M) and molality (m).
- Dilutions and the dilution equation (M1V1 = M2V2).

6. Acids and Bases

- Properties of Acids and Bases:
- Characteristics of strong and weak acids/bases.
- pH scale and pH calculations.

- Neutralization Reactions:
- General reaction of acid + base → salt + water.
- Titration basics and indicators.

7. Thermochemistry

- Laws of Thermodynamics:
- First law: conservation of energy.
- Concepts of enthalpy and entropy.

- Heat Transfer:
- Endothermic and exothermic processes.
- Calorimetry basics.

8. Chemical Kinetics and Equilibrium

- Reaction Rates:
- Factors affecting reaction rates: concentration, temperature, catalysts.
- Rate law and reaction order.

- Chemical Equilibrium:
- Dynamic nature of equilibrium.
- Le Chatelier’s principle.

Tips for Creating an Effective Chemistry Cheat Sheet

Creating a cheat sheet involves more than just compiling notes; it requires thoughtful organization and presentation of information. Here are some tips:

1. Organize by Topic: Structure your cheat sheet by major topics to allow for quick reference. Use headings and bullet points to separate different sections.

2. Use Diagrams: Incorporate diagrams, such as the periodic table, reaction mechanisms, and phase diagrams. Visual aids can help reinforce concepts.

3. Highlight Key Formulas and Constants: Use different colors or bold text for important formulas, constants, and definitions. This makes them stand out for quick recall.

4. Keep it Concise: Avoid lengthy explanations. Focus on key points, definitions, and essential equations. The goal is to make it easy to skim for information.

5. Incorporate Examples: Where applicable, include brief examples to illustrate concepts, such as sample stoichiometry problems or reaction types.

6. Practice with Your Cheat Sheet: Once you have created your cheat sheet, use it during practice exams or while studying. This helps reinforce your memory and familiarize you with the content.

Utilizing Your Chemistry Final Cheat Sheet Effectively

Once you have your cheat sheet prepared, the next step is to use it effectively:

1. Active Recall: Instead of passively reading through your cheat sheet, test yourself on the material. Cover sections and try to recall the information before checking your cheat sheet.

2. Group Study: Share your cheat sheet with classmates and discuss the topics. Teaching others is a

great way to reinforce your understanding.

3. Simulate Exam Conditions: Use your cheat sheet during practice exams to get accustomed to the format and timing of the actual test. This helps reduce anxiety on exam day.

4. Regular Review: Frequently revisit your cheat sheet in the weeks leading up to the exam. Regular exposure to the material will help solidify your understanding.

Conclusion

A well-crafted chemistry final cheat sheet can be a powerful study aid that enhances your understanding and retention of chemistry concepts. By focusing on key topics, organizing information effectively, and utilizing the cheat sheet during study sessions, you can improve your performance in your chemistry exams. Remember, the process of creating the cheat sheet is as valuable as the final product, as it encourages active engagement with the material. Good luck with your studies, and make the most of your cheat sheet!

Frequently Asked Questions

What should be included in a chemistry final cheat sheet?

A chemistry final cheat sheet should include key formulas, periodic table trends, important reaction mechanisms, definitions of essential terms, and common unit conversions.

Are cheat sheets allowed during chemistry finals?

Policies on cheat sheets vary by institution and instructor. It's important to check your course syllabus or ask your teacher to confirm if they are permitted.

How can I effectively condense information for my chemistry cheat sheet?

Focus on summarizing main concepts, use abbreviations, symbols, and diagrams, and prioritize topics that are frequently tested or that you find challenging.

Can I use a digital cheat sheet for my chemistry exam?

This depends on your school's exam policy. Some allow digital devices while others do not. Always verify with your instructor before the exam.

What are some common mistakes to avoid when creating a chemistry cheat sheet?

Common mistakes include overcrowding the sheet with too much information, neglecting to organize content logically, and failing to practice with the cheat sheet before the exam.

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