

Honors Chemistry Review Guide

Atomic structure, bonding, stoichiometry, and gases, solutions, and equilibrium — the core Honors Chemistry scope. Work a section, then try the matching questions in the practice worksheet.

SECTIONS	4	WORKED EXAMPLES	3	FORMAT	Print friendly
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How to use this guide

A formula you cannot place is not knowledge yet. Work the recall drill below before the questions.

- Balance the equation before doing any stoichiometry — an unbalanced equation makes every downstream number wrong.
- Track units through every step of a calculation; the units tell you whether you set up the problem correctly.
- Draw Lewis structures before predicting geometry or polarity — guessing from memory causes avoidable errors.

1. Atomic structure and periodic trends

NAME	FORMULA	WHEN TO USE
Atomic number	number of protons	Identifying an element.
Mass number	protons + neutrons	Finding the number of neutrons (mass number - atomic number).
Electron configuration	arrangement of electrons in energy levels	Predicting an element's chemical behavior.
Atomic radius trend	decreases left to right, increases top to bottom	Comparing sizes of atoms across the periodic table.
Electronegativity trend	increases left to right, decreases top to bottom	Predicting which atom pulls electrons harder in a bond.

WORKED EXAMPLE

An atom has 17 protons and a mass number of 35. Find the number of neutrons.

1. Neutrons = mass number - atomic number
2. = 35 - 17
3. = 18

Check: 17 protons identifies chlorine, and Cl-35 is its most common isotope.

2. Bonding and molecular geometry

NAME	FORMULA	WHEN TO USE
Ionic bond	transfer of electrons, metal + nonmetal	Bonding between very different electronegativities.

NAME	FORMULA	WHEN TO USE
Covalent bond	sharing of electrons, nonmetal + nonmetal	Bonding between similar electronegativities.
Polar covalent bond	unequal sharing of electrons	A bond between atoms with different electronegativities.
VSEPR theory	electron pairs arrange to minimize repulsion	Predicting a molecule's 3D shape.
Intermolecular forces (strength)	hydrogen bonding > dipole-dipole > dispersion	Explaining boiling point differences between molecules.

3. Stoichiometry and reactions

NAME	FORMULA	WHEN TO USE
Molar mass	sum of atomic masses in a formula (g/mol)	Converting between mass and moles.
Moles to particles	moles $\times 6.022 \times 10^{23}$	Counting atoms, molecules, or ions.
Mole ratio	from the coefficients of a balanced equation	Converting moles of one substance to moles of another.
Limiting reactant	the reactant that runs out first	Determining maximum possible product.
Percent yield	(actual yield/theoretical yield) $\times 100\%$	Comparing lab results to the predicted amount.

WORKED EXAMPLE

Balance: $__\text{Fe} + __\text{O}_2 \rightarrow __\text{Fe}_2\text{O}_3$.

- Balance Fe: 4 Fe on the left
- Balance O: 3 O_2 gives 6 O, matching 2 Fe_2O_3
- $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$

Check: 4 Fe, 6 O on each side confirms the balance.

4. Gases, solutions, and equilibrium

NAME	FORMULA	WHEN TO USE
Ideal gas law	$PV = nRT$	Relating pressure, volume, moles, and temperature of a gas.
Molarity	moles of solute / liters of solution	Describing a solution's concentration.
Dilution equation	$M_1V_1 = M_2V_2$	Finding a new concentration after adding solvent.
Le Chatelier's principle	a system at equilibrium shifts to relieve a stress	Predicting how equilibrium responds to a change.

NAME	FORMULA	WHEN TO USE
pH scale	$\text{pH} = -\log[\text{H}^+]$	Measuring acidity or basicity of a solution.

WORKED EXAMPLE

Find the molarity of a solution with 2 moles of solute in 4 liters of solution.

1. $M = \text{moles/liters}$
2. $M = 2/4$

Check: = 0.5 M.

Notes and tutor hand-off

Bring this page to your next session so the tutor can start from what actually blocked you.

Which stoichiometry step do you skip most often?

One periodic trend you keep mixing up:

Worksheet question numbers to review with a tutor:
