

Named reactions and molecule pages

Reference pages for named reactions and common molecules, and the related product pages.

MolDraw (<https://www.moldraw.com>) · Help centre: <https://www.moldraw.com/support/> · Updated 2026-10-17

MolDraw Addons | PowerPoint and Word (Coming Soon)

<https://www.moldraw.com/addons>

MolDraw addons for Microsoft PowerPoint and Word are coming soon. Draw structures in the browser today, then place them in slides and documents.

Coming soon · in testing

Chrome & Edge addon →

Snip any molecule image on a web page or PDF and open it as an editable structure in MolDraw. [See the interactive demo.](#)

ChemSketch Alternative: Free Online Chemical Structure Editor

<https://www.moldraw.com/chemsketch>

ChemSketch alternative: free online chemical structure editor. Compare ACD/ChemSketch software with MolDraw for browser molecule drawing, SMILES, 3D viewing, and exports—no install.

Published: 11 Sep 2026 · Updated: 11 Sep 2026 · Author: Scidart Academy · Reading time: ~6 min

You have heard of **ChemSketch** (ACD/ChemSketch) and want to know what it is, or you need a chemical structure editor you can use right now. This page explains what ChemSketch is and shows a free editor that runs in your browser.

Short answer: MolDraw is a free ChemSketch alternative for everyday chemical structure drawing—open the editor in your browser, draw molecules, copy SMILES, view in 3D, and export figures without installing desktop ChemSketch software. [Run MolDraw in your browser](#)
[ChemSketch free options](#) [Looking for a download?](#)

What is ChemSketch?

ChemSketch, also called **ACD/ChemSketch**, is chemical structure drawing software long associated with ACD/Labs. People use ChemSketch software to draw 2D structures, communicate molecules in reports, and support teaching or lab documentation.

If you just need to draw a molecule today, you may not need ChemSketch at all. A free online editor can handle most everyday drawing without an install.

MolDraw is not ChemSketch and is not affiliated with ACD/Labs. It is an independent free browser app from Scidart Academy that covers many of the same everyday drawing tasks.

Free online ChemSketch alternative

If your goal is a **free online chemical structure editor**, MolDraw is built for that workflow:

- Draw and edit 2D chemical structures in the browser
- Paste or copy SMILES for fast handoffs
- Search known compounds by name and inspect properties
- View molecules in 3D
- Export images and common chemistry formats for reports and slides

[Start drawing in MolDraw](#)

ChemSketch vs MolDraw (practical comparison)

Criteria	ChemSketch / ACD ChemSketch	MolDraw
Access model	Historically desktop / licensed ChemSketch software	Free browser app at moldraw.com
Setup	Install / account / institutional access may be required	Open URL and start drawing
2D structure editing	Established chemical drawing feature set	Browser-first editor for everyday structures
SMILES / identifiers	Depends on product edition and workflow	Copy/paste SMILES-friendly workflows
3D viewing	Varies by product ecosystem	Integrated 3D molecular viewer
Best fit	Users already inside ACD/ChemSketch pipelines	Students, teachers, quick lab communication, no-install drawing

When MolDraw is the better ChemSketch alternative

Choose MolDraw when you need to:

- Start drawing right away, without an install or licence
- Avoid ChemSketch software installs on shared or locked-down machines
- Draw structures for homework, slides, lab notebooks, or quick research notes
- Move between 2D drawing, SMILES, and 3D viewing in one browser session

Stay with ChemSketch / ACD ChemSketch only if your institution already depends on that specific product stack and templates.

FAQ: ChemSketch and MolDraw

What is ChemSketch?

ChemSketch is chemical structure drawing software commonly associated with ACD/Labs (ACD/ChemSketch). People use it to draw molecules and share chemical structures.

Is there a free ChemSketch alternative?

Yes. MolDraw is a free online chemical structure editor for common drawing, SMILES, 3D viewing, and export tasks.

Is MolDraw ChemSketch?

No. MolDraw is independent software from Scidart Academy and is not ACD ChemSketch.

Where do I find ChemSketch free or ChemSketch download info?

See [ChemSketch free](#) for what to check before you look for a free version, and [ChemSketch download](#) for what to do if you cannot get the installer. Both pages link to the free MolDraw editor.

ChemSketch Download: Try MolDraw in Your Browser

<https://www.moldraw.com/chemsketch-download>

Looking for the ChemSketch download? ChemSketch is no longer available to new users. Try MolDraw directly in your browser—free chemical structure editor, no install.

Published: 11 Sep 2026 • Updated: 11 Sep 2026 • Author: Scidart Academy **Looking for the ChemSketch download?** ChemSketch is no longer available to new users. Try MolDraw directly in your browser.

Run MolDraw here — free chemical structure editor

You do not need an installer. Open the editor, draw molecules, use SMILES, view them in 3D, and export for class or lab work.

[Open MolDraw editor](#) [Optional: MolDraw for Windows](#)

Why you may not need the download

You want a chemical structure editor that works today. ChemSketch is not available to new users, so looking for an installer wastes time and often leads to outdated third-party download pages. A browser editor lets you start drawing now.

MolDraw is a free, independent browser app from Scidart Academy. It is not ChemSketch and does not redistribute ChemSketch software.

What to do instead of downloading ChemSketch

- **Open MolDraw** and start drawing in the browser
- Read [what ChemSketch is](#) and how MolDraw compares as an alternative
- If you want to know what to check before you look for a free version, see [ChemSketch free / freeware](#)
- If you want a Windows installer for MolDraw (not ChemSketch), use the [official MolDraw Windows guide](#)

[Try MolDraw now](#)

FAQ: ChemSketch download

Looking for the ChemSketch download?

ChemSketch is no longer available to new users. Try MolDraw directly in your browser.

Can I download ACD ChemSketch software as a new user?

ChemSketch is no longer available to new users. Use MolDraw for free online chemical structure editing instead.

Does MolDraw provide a ChemSketch installer?

No. MolDraw does not host or distribute ChemSketch. It is a separate free editor you can run at moldraw.com.

ChemSketch Free & ACD ChemSketch Freeware Alternative

<https://www.moldraw.com/chemsketch-free>

ChemSketch free and ACD ChemSketch freeware alternatives. Use MolDraw—a free online chemical structure editor in your browser. No ChemSketch freeware install required.

Published: 11 Sep 2026 • Updated: 15 Oct 2026 • Author: Scidart Academy • Reading time: ~6 min

You want to draw molecules without paying for software. ACD/ChemSketch's free edition and how it is distributed have changed over the years, so many "free download" pages are out of date or lead to paid versions. Here is what to check, and a free option that runs in your browser.

Short answer: Check the ACD/Labs website for the current ChemSketch terms. If you need to draw a structure now, open MolDraw in your browser. It is free, needs no install, and you do not need an account to draw. MolDraw is a separate app and is not made by ACD/Labs.

[Run the free MolDraw editor](#) [What is ChemSketch?](#) [ChemSketch download page](#)

Is ChemSketch free?

ACD/ChemSketch is desktop software from ACD/Labs for drawing chemical structures. People use it to draw molecules for coursework, reports and lab notes.

ChemSketch's free edition, its terms and the way you get it have changed over time. Pages that promise a "ChemSketch free download" may describe an older version or send you to a paid one. Before you download anything:

- Go to the official ACD/Labs website and check what is offered now, and on what terms.
- Avoid third-party download sites. Their installers can be old, changed, or bundled with other software.

- Check that the version runs on your computer and that its licence covers your use, such as a class, research or commercial work.

MolDraw is not ChemSketch and is not affiliated with ACD/Labs. It is an independent free web app from Scidart Academy.

What a free alternative must do

Most people who look for ChemSketch need a few basic jobs done. Any free editor you pick should handle them:

- **Draw structures:** atoms, bonds, rings, charges and wedge bonds for stereochemistry.
- **Name and convert:** show the name, formula and weight, and move between names, SMILES and chemistry files.
- **Export:** save images for slides and papers, and files that other chemistry software can open.
- **Run where you work:** on school and lab computers where you cannot install software.

Why try a browser editor first

Nothing to install Open [molDraw.com](#) and start drawing. You skip installers and download sites. Works on locked PCs School and lab machines often block installs. A browser editor still works. No account to draw Drawing, 3D viewing and exports are free. Your work saves in your browser. [Start free in MolDraw](#)

How to do common tasks in MolDraw

Draw a structure

Open the [editor](#). Pick an element in the atom palette, a bond type in the left rail, or a ring from the ring bar. Then click the canvas. Click **Clean up** to tidy the drawing. The guide [Draw your first structure](#) walks through phenol step by step.

Start from a name, CAS number or SMILES

Type a name such as *caffeine*, or a CAS number, in the search box at the top. MolDraw draws the structure from PubChem. To start from SMILES, click **Paste SMILES**. You can also use the [name to structure tool](#).

Get the name, formula and weight

Select the molecule and click **Info**. The panel shows the IUPAC name, formula, molecular weight, SMILES and InChI, each with a copy button. Without drawing, you can use the [SMILES to IUPAC name converter](#) or the [molecular weight calculator](#).

Convert between formats

Click **Copy SMILES** to copy your structure as text. Right-click for other formats, such as InChI and MOL. For files you already have, the [free chemistry tools](#) include converters such as [SMILES to MOL](#) and [MOL to SMILES](#).

Export images and files

Click **Download** and pick a format. Use SVG or PDF for papers, PNG for slides, and MOL, SDF or CDXML to open your structure in other chemistry software. To keep the whole canvas, click **File**, then **Save**. See [Download and file formats](#) for the full list.

View the molecule in 3D

The 3D panel builds a model from your drawing. Drag to rotate it. You can also start from SMILES with the [SMILES to 3D structure tool](#).

Prefer an app on Windows? See [MolDraw for Windows](#).

ChemSketch vs MolDraw

ChemSketch details depend on the edition and can change, so confirm them on the ACD/Labs website.

MolDraw Chrome Addon | Snip Any Molecule Image to an Editable Structure (Coming Soon)

<https://www.moldraw.com/chrome-addon>

The MolDraw Chrome and Edge addon lets you click-and-drag over any molecule image in a paper, PDF or web page, or upload an image, and opens the editable structure in MolDraw. Coming soon to the Chrome Web Store.

Click the MolDraw icon

From any tab: a paper on a publisher site, a PDF in the browser, lecture slides, Wikipedia, a supplier catalogue. The page dims and the cursor turns into a crosshair. The page is frozen so nothing scrolls under you.

Interactive MolDraw demos | Step-by-step, no video

<https://www.moldraw.com/demos/>

Step-by-step interactive demos of MolDraw played on a lightweight copy of the editor. Embed them in articles, docs and courses.

Each demo plays a task step by step on a lightweight copy of the MolDraw editor. Pause it, step back, or go at your own pace. They load in a blink, stay sharp on any screen, and you can embed them in your own pages. Press **Try it yourself** to do the same steps in the real editor with a guided tour.

Turn on the canvas grid

Show the background grid from the top bar, from Settings, or with the command palette, and turn on Snap to grid.

[Read the article](#)[Open on its own](#)

Embed a demo

On any website, use an iframe:

```
<iframe src="https://www.moldraw.com/demos/embed.html?demo=turn-on-grid"
title="MolDraw demo: Turn on the canvas grid" loading="lazy"
style="width:100%;max-width:980px;height:640px;border:0"></iframe>
```

On moldraw.com pages, use the element directly:

```
<script src="/demos/player.js" defer></script>
<moldraw-demo src="/demos/turn-on-grid.json"></moldraw-demo>
```

Make a new demo

- Demos are JSON files described by the [demo schema](#).
- The [authoring guide](#) lists every target, action and rule, written so an AI assistant can draft demos too.
- All demos: [catalog \(JSON\)](#).

3D Molecule Models - 29 Interactive Ball-and-Stick Molecular Models

<https://www.moldraw.com/molecules/>

Free interactive 3D models of 29 common molecules (water, methane, CO₂, glucose, caffeine, benzene and more): ball-and-stick and space-filling views, shapes, bond angles, polarity and facts.

Interactive ball-and-stick and space-filling models of common molecules, from water and methane to glucose, caffeine and ATP. Each page explains the molecule's shape, bond angles, polarity, composition and uses.

Quick answer: tap any molecule to open its rotatable 3D model. To look up a different molecule, use the [3D molecular model viewer](#).

Inorganic & small molecules

WaterH₂O · 18.015 g/mol **Ammonia**NH₃ · 17.031 g/mol **Carbon dioxide**CO₂ · 44.009 g/mol **Oxygen**O₂ · 31.999 g/mol **Ozone**O₃ · 47.998 g/mol **Hydrogen chloride**HCl · 36.46 g/mol

Hydrocarbons & fuels

MethaneCH₄ · 16.043 g/mol **Propane**C₃H₈ · 44.1 g/mol **Benzene**C₆H₆ · 78.11 g/mol

Alcohols & solvents

MethanolCH₄O · 32.042 g/mol **Ethanol**C₂H₆O · 46.07 g/mol **Acetone**C₃H₆O · 58.08 g/mol

Sugars & carbohydrates

Glucose $\text{C}_6\text{H}_{12}\text{O}_6 \cdot 180.16 \text{ g/mol}$ **Sucrose** $\text{C}_{12}\text{H}_{22}\text{O}_{11} \cdot 342.3 \text{ g/mol}$ **Fructose** $\text{C}_6\text{H}_{12}\text{O}_6 \cdot 180.16 \text{ g/mol}$

Biomolecules

Glycine $\text{C}_2\text{H}_5\text{NO}_2 \cdot 75.07 \text{ g/mol}$ **Glycerol** $\text{C}_3\text{H}_8\text{O}_3 \cdot 92.09 \text{ g/mol}$ **Citric acid** $\text{C}_6\text{H}_8\text{O}_7 \cdot 192.12 \text{ g/mol}$ **Vitamin C (ascorbic acid)** $\text{C}_6\text{H}_8\text{O}_6 \cdot 176.12 \text{ g/mol}$ **ATP (adenosine triphosphate)** $\text{C}_{10}\text{H}_{16}\text{N}_5\text{O}_{13}\text{P}_3 \cdot 507.18 \text{ g/mol}$

Flavours & natural products

Vanillin $\text{C}_8\text{H}_8\text{O}_3 \cdot 152.15 \text{ g/mol}$

Drugs & medicines

Caffeine $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2 \cdot 194.19 \text{ g/mol}$ **Aspirin** $\text{C}_9\text{H}_8\text{O}_4 \cdot 180.16 \text{ g/mol}$

Neurotransmitters & hormones

Serotonin $\text{C}_{10}\text{H}_{12}\text{N}_2\text{O} \cdot 176.21 \text{ g/mol}$ **Adrenaline (epinephrine)** $\text{C}_9\text{H}_{13}\text{NO}_3 \cdot 183.2 \text{ g/mol}$ **Melatonin** $\text{C}_{13}\text{H}_{16}\text{N}_2\text{O}_2 \cdot 232.28 \text{ g/mol}$

Steroids & lipids

Cholesterol $\text{C}_{27}\text{H}_{46}\text{O} \cdot 386.7 \text{ g/mol}$ **Testosterone** $\text{C}_{19}\text{H}_{28}\text{O}_2 \cdot 288.4 \text{ g/mol}$ **Estradiol (estrogen)** $\text{C}_{18}\text{H}_{24}\text{O}_2 \cdot 272.4 \text{ g/mol}$

Drawing structures for your notes? MolDraw is a free online chemical structure editor for molecules, reactions and lab diagrams.

[Open MolDraw editor](#)

Frequently asked questions

What is a molecular model?

A physical or digital 3D representation of a molecule showing its atoms and bonds. Ball-and-stick models show bonds and angles clearly. Space-filling models show the true relative size and overall shape.

What do the colours in a molecular model mean?

Most kits and viewers use CPK colours: carbon grey or black, hydrogen white, oxygen red, nitrogen blue, chlorine green, sulfur yellow and phosphorus orange.

Where do the 3D coordinates come from?

Each model uses the computed 3D conformer published by PubChem (NIH), so bond lengths and angles are realistic.

Can I view a molecule that is not listed?

Yes. Open the 3D molecular model viewer and type any name, SMILES or PubChem CID, or draw one in Build a Molecule.

Related tools

3D molecular model viewerAny molecule**Build a molecule**Molecule builder**VSEPR calculator**Shapes & angles**Molecule structure references**Identifiers & properties

Acetone Molecule Model - Interactive 3D Structure (C₃H₆O)

<https://www.moldraw.com/molecules/acetone.html>

Rotate a 3D ball-and-stick and space-filling model of acetone (C₃H₆O, 58.08 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Acetone (propan-2-one) is the simplest ketone. The central carbonyl carbon is trigonal planar and sp², flanked by two tetrahedral methyl groups. The polar C=O makes acetone an excellent solvent.

Quick answer: Acetone is **C₃H₆O**, molar mass **58.08 g/mol**. Trigonal planar, sp² around C=O carbon. Polar (about 2.9 D) because of the C=O bond, but it has no O-H, so it accepts hydrogen bonds without donating them. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 180).

Acetone at a glance

Formula	C ₃ H ₆ O
Molar mass	58.08 g/mol
IUPAC name	propan-2-one
Atoms / bonds	10 / 9
H-bond donors / acceptors	0 / 1
XLogP3	-0.1
SMILES	CC(=O)C
PubChem CID	180

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Acetone shows

The model contains **10 atoms** (4 heavy atoms and 6 hydrogens) joined by **9 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 0 and accept 1 hydrogen bonds, and its PubChem XLogP3 of -0.1 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 17.1 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C=O carbon	Trigonal planar, sp^2	C-C-C $\approx 117^\circ$, C-C=O $\approx 121.5^\circ$
CH ₃ carbons	Tetrahedral, sp^3	$\approx 109.5^\circ$

Is Acetone polar?

Polar (about 2.9 D) because of the C=O bond, but it has no O-H, so it accepts hydrogen bonds without donating them.

Elemental composition of C₃H₆O

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	3	36.033	62.04%
Hydrogen (H)	6	6.048	10.41%
Oxygen (O)	1	15.999	27.55%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of acetone

- Nail-polish remover and paint thinner
- Solvent for plastics, resins and lab glassware rinsing
- Feedstock for methyl methacrylate and bisphenol A

Interesting facts

- The human body makes acetone as a ketone body during fasting.
- Acetone boils at 56 °C and is highly flammable.
- It is miscible with water, ethanol and most organic solvents.

Drawing structures for your notes? MolDraw is a free online chemical structure editor for molecules, reactions and lab diagrams.

[Open MolDraw editor](#)

Frequently asked questions

What is the shape of acetone?

The carbonyl carbon is trigonal planar (sp^2 , about 120°) and the two methyl carbons are tetrahedral.

Is acetone polar?

Yes. The C=O bond gives a large dipole (about 2.9 D), so acetone dissolves both polar and many non-polar substances.

What is the chemical formula and molar mass of acetone?

Acetone is C₃H₆O with a molar mass of 58.08 g/mol (PubChem CID 180). It contains 10 atoms: 3 carbon, 6 hydrogen, 1 oxygen.

What is the IUPAC name of Acetone?

The PubChem-computed IUPAC name is propan-2-one.

How do I make a model of Acetone?

Rotate the interactive model above to see how its 10 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Methanol 3D modelCH₄O**Ethanol 3D model**C₂H₆O**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Adrenaline Molecule Model - Interactive 3D Structure (C₉H₁₃NO₃)

<https://www.moldraw.com/molecules/adrenaline.html>

Rotate a 3D ball-and-stick and space-filling model of adrenaline (C₉H₁₃NO₃, 183.2 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Adrenaline (epinephrine) is a catecholamine hormone: a benzene ring with two adjacent OH groups (catechol) and a side chain with one stereocentre and a secondary amine.

Quick answer: Adrenaline is **C₉H₁₃NO₃**, molar mass **183.2 g/mol**. Planar aromatic, sp². Polar. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 5816).

Adrenaline at a glance

Formula	C ₉ H ₁₃ NO ₃
Molar mass	183.2 g/mol
IUPAC name	4-[(1R)-1-hydroxy-2-(methylamino)ethyl]benzene-1,2-diol
Atoms / bonds	26 / 26
H-bond donors / acceptors	4 / 4
XLogP3	-1.4
SMILES	CNC[C@@H](C1=CC(=C(C=C1)O)O)O

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Adrenaline shows

The model contains **26 atoms** (13 heavy atoms and 13 hydrogens) joined by **26 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 4 and accept 4 hydrogen bonds, and its PubChem XLogP3 of -1.4 means it is very water-loving (hydrophilic). Its topological polar surface area is 72.7 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring carbons	Planar aromatic, sp ²	120°
chiral C-OH	Tetrahedral, sp ³ (R in natural adrenaline)	≈ 109.5°
amine N	Trigonal pyramidal, sp ³	≈ 107-109°

Is Adrenaline polar?

Polar. The catechol OH groups and protonated amine make it water-soluble.

Elemental composition of C₉H₁₃NO₃

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	9	108.099	59.00%
Hydrogen (H)	13	13.104	7.15%
Nitrogen (N)	1	14.007	7.65%
Oxygen (O)	3	47.997	26.20%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of adrenaline

- Fight-or-flight hormone from the adrenal glands
- EpiPen treatment for anaphylaxis
- Cardiac arrest and local anaesthetic formulations

Interesting facts

- Natural adrenaline is the (R)-enantiomer, which is far more active than (S).
- It was one of the first hormones to be isolated (1901) and synthesised (1904).
- Its catechol group oxidises easily, which is why solutions turn pink or brown with age.

Drawing structures for your notes? MolDraw is a free online chemical structure editor for molecules, reactions and lab diagrams.

[Open MolDraw editor](#)

Frequently asked questions

Is adrenaline chiral?

Yes. The carbon bearing the OH group is a stereocentre, and the body makes the (R) enantiomer.

What is a catecholamine?

A molecule with a catechol (1,2-dihydroxybenzene) ring and an amine side chain, such as adrenaline, noradrenaline and dopamine.

What is the chemical formula and molar mass of adrenaline?

Adrenaline is C₉H₁₃NO₃ with a molar mass of 183.2 g/mol (PubChem CID 5816). It contains 26 atoms: 9 carbon, 13 hydrogen, 1 nitrogen, 3 oxygen.

What is the IUPAC name of Adrenaline?

The PubChem-computed IUPAC name is 4-[(1R)-1-hydroxy-2-(methylamino)ethyl]benzene-1,2-diol.

How do I make a model of Adrenaline?

Rotate the interactive model above to see how its 26 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Serotonin 3D modelC₁₀H₁₂N₂O**Melatonin 3D model**C₁₃H₁₆N₂O₂**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Ammonia Molecule Model - Interactive 3D Structure (NH₃)

<https://www.moldraw.com/molecules/ammonia.html>

Rotate a 3D ball-and-stick and space-filling model of ammonia (NH₃, 17.031 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Ammonia is the classic trigonal pyramidal molecule. Nitrogen bonds to three hydrogens and keeps one lone pair, which makes ammonia a base and a key building block for fertilisers.

Quick answer: Ammonia is **NH₃**, molar mass **17.031 g/mol**. Trigonal pyramidal (AX₃E), tetrahedral electron geometry, sp³ around N. Polar (dipole moment about 1.47 D). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 222).

Ammonia at a glance

Formula	NH ₃
Molar mass	17.031 g/mol
IUPAC name	azane
Atoms / bonds	4 / 3
H-bond donors / acceptors	1 / 1
XLogP3	-0.7
SMILES	N
PubChem CID	222

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Ammonia shows

The model contains **4 atoms** (1 heavy atom and 3 hydrogens) joined by **3 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 1 hydrogen bonds, and its PubChem XLogP3 of -0.7 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 1 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
N	Trigonal pyramidal (AX ₃ E), tetrahedral electron geometry, sp ³	H-N-H 107.8°; N-H 101.2 pm

Is Ammonia polar?

Polar (dipole moment about 1.47 D). The lone pair and the pyramidal shape stop the N-H dipoles from cancelling.

Elemental composition of NH₃

Element	Atoms	Mass (g/mol)	Mass %
Hydrogen (H)	3	3.024	17.76%
Nitrogen (N)	1	14.007	82.24%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of ammonia

- Haber-Bosch ammonia is the raw material for most nitrogen fertilisers
- Household cleaners (aqueous ammonia)
- Refrigerant (R-717) in industrial cooling

Interesting facts

- The nitrogen atom flips through the plane of the H atoms ("umbrella inversion") about 24 billion times a second.
- The lone pair lets ammonia accept a proton to form the tetrahedral ammonium ion, NH_4^+ .
- Ammonia boils at $-33\text{ }^\circ\text{C}$ but is easily liquefied under pressure.

Drawing structures for your notes? MolDraw is a free online chemical structure editor for molecules, reactions and lab diagrams.

[Open MolDraw editor](#)

Frequently asked questions

What is the shape of ammonia?

Trigonal pyramidal: three N-H bonds and one lone pair around nitrogen, with H-N-H angles of about 107° .

Why is the bond angle in NH_3 less than 109.5° ?

The lone pair repels the bonding pairs more strongly than they repel each other, squeezing the angle to 107.8° .

What is the chemical formula and molar mass of ammonia?

Ammonia is NH_3 with a molar mass of 17.031 g/mol (PubChem CID 222). It contains 4 atoms: 3 hydrogen, 1 nitrogen.

What is the IUPAC name of Ammonia?

The PubChem-computed IUPAC name is azane.

How do I make a model of Ammonia?

Rotate the interactive model above to see how its 4 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Water 3D model H_2O **Carbon dioxide 3D model** CO_2 **Oxygen 3D model** O_2 **Ozone 3D model** O_3 **Hydrogen chloride 3D model** HCl **Methane 3D model** CH_4 **3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Aspirin Molecule Model - Interactive 3D Structure (C₉H₈O₄)

<https://www.moldraw.com/molecules/aspirin.html>

Rotate a 3D ball-and-stick and space-filling model of aspirin (C₉H₈O₄, 180.16 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Aspirin (acetylsalicylic acid) is a benzene ring carrying a carboxylic acid and an acetyl ester side by side (ortho). The ester transfers its acetyl group to the COX enzyme, which is how aspirin works.

Quick answer: Aspirin is **C₉H₈O₄**, molar mass **180.16 g/mol**. Trigonal planar, sp². Polar but only slightly soluble in water (about 3 g/L). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 2244).

Aspirin at a glance

Formula	C ₉ H ₈ O ₄
Molar mass	180.16 g/mol
IUPAC name	2-acetyloxybenzoic acid
Atoms / bonds	21 / 21
H-bond donors / acceptors	1 / 4
XLogP3	1.2
SMILES	<chem>CC(=O)OC1=CC=CC=C1C(=O)O</chem>
PubChem CID	2244

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Aspirin shows

The model contains **21 atoms** (13 heavy atoms and 8 hydrogens) joined by **21 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 4 hydrogen bonds, and its PubChem XLogP3 of 1.2 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 63.6 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring carbons	Trigonal planar, sp ² ; planar ring	120°
ester and acid C=O carbons	Trigonal planar, sp ²	≈ 120°
acetyl CH ₃	Tetrahedral, sp ³	≈ 109.5°

Is Aspirin polar?

Polar but only slightly soluble in water (about 3 g/L). It is a weak acid with pK_a ≈ 3.5.

Elemental composition of C₉H₈O₄

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	9	108.099	60.00%
Hydrogen (H)	8	8.064	4.48%
Oxygen (O)	4	63.996	35.52%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of aspirin

- Pain relief, fever and inflammation (NSAID)
- Low-dose aspirin to prevent blood clots
- Made from salicylic acid and acetic anhydride

Interesting facts

- Aspirin irreversibly acetylates a serine in COX-1 and COX-2 enzymes.
- It was first marketed by Bayer in 1899.
- Old aspirin can smell of vinegar because the ester slowly hydrolyses to acetic acid and salicylic acid.

Need identifiers (InChI, InChIKey), computed properties and file downloads? See the [Aspirin structure reference page](#).

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Frequently asked questions

What functional groups are in aspirin?

A carboxylic acid, an ester (acetyl) and an aromatic benzene ring.

How is aspirin made?

By acetylating the OH group of salicylic acid with acetic anhydride, which also gives acetic acid.

What is the chemical formula and molar mass of aspirin?

Aspirin is C₉H₈O₄ with a molar mass of 180.16 g/mol (PubChem CID 2244). It contains 21 atoms: 9 carbon, 8 hydrogen, 4 oxygen.

What is the IUPAC name of Aspirin?

The PubChem-computed IUPAC name is 2-acetyloxybenzoic acid.

How do I make a model of Aspirin?

Rotate the interactive model above to see how its 21 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Caffeine 3D modelC₈H₁₀N₄O₂**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**Oxygen 3D model**O₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

ATP Molecule Model - Interactive 3D Structure (C₁₀H₁₆N₅O₁₃P₃)

<https://www.moldraw.com/molecules/atp.html>

Rotate a 3D ball-and-stick and space-filling model of ATP (C₁₀H₁₆N₅O₁₃P₃, 507.18 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

ATP, the energy currency of the cell, has three parts: the base adenine (planar purine), the sugar ribose (five-membered ring) and a chain of three phosphate groups linked by phosphoanhydride bonds.

Quick answer: ATP is **C₁₀H₁₆N₅O₁₃P₃**, molar mass **507.18 g/mol**. Planar aromatic, sp² around adenine. Very polar and highly charged: about -4 at pH 7, usually bound to Mg²⁺ in cells. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 5957).

ATP at a glance

Formula	C ₁₀ H ₁₆ N ₅ O ₁₃ P ₃
Molar mass	507.18 g/mol

IUPAC name	[[(2R,3S,4R,5R)-5-(6-aminopurin-9-yl)-3,4-dihydroxyoxolan-2-yl]methoxy-hydroxyphosphoryl] phosphono hydrogen phosphate
Atoms / bonds	47 / 49
H-bond donors / acceptors	7 / 17
XLogP3	-5.7
SMILES	<chem>C1=NC(=C2C(=N1)N(C=N2)[C@H]3[C@@H]([C@@H]([C@H](O3)COP(=O)(O)OP(=O)(O)OP(=O)(O)O)O)N</chem>
PubChem CID	5957

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of ATP shows

The model contains **47 atoms** (31 heavy atoms and 16 hydrogens) joined by **49 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 7 and accept 17 hydrogen bonds, and its PubChem XLogP3 of -5.7 means it is very water-loving (hydrophilic). Its topological polar surface area is 279 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
adenine	Planar aromatic, sp ²	≈ 120°
ribose	Five-membered envelope ring, sp ³	≈ 105°
P (×3)	Tetrahedral phosphate groups	O-P-O ≈ 109.5°

Is ATP polar?

Very polar and highly charged: about -4 at pH 7, usually bound to Mg²⁺ in cells.

Elemental composition of C₁₀H₁₆N₅O₁₃P₃

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	10	120.110	23.68%
Hydrogen (H)	16	16.128	3.18%
Nitrogen (N)	5	70.035	13.81%
Oxygen (O)	13	207.987	41.01%
Phosphorus (P)	3	92.922	18.32%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of ATP

- Energy carrier: hydrolysis to ADP releases about -30.5 kJ/mol (standard conditions)
- Substrate for kinases (phosphorylation) and RNA synthesis
- Signalling molecule (e.g. converted to cyclic AMP)

Interesting facts

- A human turns over roughly their own body weight in ATP every day.
- ATP synthase makes ATP by rotary catalysis driven by a proton gradient.
- In cells ATP exists mostly as a Mg^{2+} -ATP complex.

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Frequently asked questions

What are the three parts of ATP?

Adenine (a nitrogen base), ribose (a sugar) and three phosphate groups.

Where is the energy in ATP?

Hydrolysing the terminal phosphoanhydride bond to give $\text{ADP} + \text{P}_i$ is strongly exergonic, because the products are better stabilised by resonance and hydration and have less charge repulsion.

What is the chemical formula and molar mass of ATP?

ATP is $\text{C}_{10}\text{H}_{16}\text{N}_5\text{O}_{13}\text{P}_3$ with a molar mass of 507.18 g/mol (PubChem CID 5957). It contains 47 atoms: 10 carbon, 16 hydrogen, 5 nitrogen, 13 oxygen, 3 phosphorus.

What is the IUPAC name of ATP?

The PubChem-computed IUPAC name is [[(2R,3S,4R,5R)-5-(6-aminopurin-9-yl)-3,4-dihydroxyoxolan-2-yl]methoxy-hydroxyphosphoryl] phosphono hydrogen phosphate.

How do I make a model of ATP?

With 47 atoms, ATP is a big kit build. Use the interactive model above as your guide, build the ring or core framework first, then add the side groups and finally the hydrogens.

More molecule models & tools

[Glycine 3D model](#) $\text{C}_2\text{H}_5\text{NO}_2$ [Glycerol 3D model](#) $\text{C}_3\text{H}_8\text{O}_3$ [Citric acid 3D](#)

[model](#) $\text{C}_6\text{H}_8\text{O}_7$ [Vitamin C \(ascorbic acid\) 3D model](#) $\text{C}_6\text{H}_8\text{O}_6$ [Water 3D](#)

[model](#) H_2O [Methane 3D model](#) CH_4 [3D molecular model viewer](#)Any molecule by name or SMILES[Build a molecule](#)Molecule builder kit[VSEPR geometry calculator](#)Shapes & bond angles[Molar mass calculator](#)Any formula

Benzene Molecule Model - Interactive 3D Structure (C₆H₆)

<https://www.moldraw.com/molecules/benzene.html>

Rotate a 3D ball-and-stick and space-filling model of benzene (C₆H₆, 78.11 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Benzene is a flat hexagonal ring of six sp² carbons with a delocalised π system of six electrons. It is the parent aromatic compound, and all six C-C bonds are identical.

Quick answer: Benzene is **C₆H₆**, molar mass **78.11 g/mol**. Trigonal planar, sp² around C (×6). Nonpolar: the hexagon is perfectly symmetric. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 241).

Benzene at a glance

Formula	C ₆ H ₆
Molar mass	78.11 g/mol
IUPAC name	benzene
Atoms / bonds	12 / 12
H-bond donors / acceptors	0 / 0
XLogP3	2.1
SMILES	C1=CC=CC=C1
PubChem CID	241

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Benzene shows

The model contains **12 atoms** (6 heavy atoms and 6 hydrogens) joined by **12 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It has no hydrogen-bond donors or acceptors, so it interacts mainly through weak London dispersion forces, and its PubChem XLogP3 of 2.1 means it is fat-loving (lipophilic). Its topological polar surface area is 0 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C (×6)	Trigonal planar, sp ² ; whole molecule planar hexagon	C-C-C and H-C-C 120°; all C-C 139.7 pm

Is Benzene polar?

Nonpolar: the hexagon is perfectly symmetric.

Elemental composition of C₆H₆

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	6	72.066	92.26%
Hydrogen (H)	6	6.048	7.74%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of benzene

- Feedstock for styrene, phenol, cyclohexane (nylon) and many drugs and dyes
- Historically a solvent (now restricted)

Interesting facts

- All six C-C bonds are 139.7 pm long, between a C-C single bond (154 pm) and a C=C double bond (134 pm).
- Kekulé proposed the ring structure in 1865, reportedly after dreaming of a snake biting its tail.
- Benzene is a known human carcinogen, so toluene is used instead where possible.

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Frequently asked questions

Why is benzene planar?

Every carbon is sp² hybridised, and the unhybridised p orbitals must line up side by side to form the delocalised π ring.

Does benzene have alternating single and double bonds?

No. The two Kekulé structures are resonance forms, and all six bonds are equal (bond order 1.5).

What is the chemical formula and molar mass of benzene?

Benzene is C₆H₆ with a molar mass of 78.11 g/mol (PubChem CID 241). It contains 12 atoms: 6 carbon, 6 hydrogen.

What is the IUPAC name of Benzene?

The PubChem-computed IUPAC name is benzene.

How do I make a model of Benzene?

Rotate the interactive model above to see how its 12 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Methane 3D modelCH4**Propane 3D model**C3H8**Water 3D model**H2O**Ammonia 3D model**NH3**Carbon dioxide 3D model**CO2**Oxygen 3D model**O2**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Caffeine Molecule Model - Interactive 3D Structure (C₈H₁₀N₄O₂)

<https://www.moldraw.com/molecules/caffeine.html>

Rotate a 3D ball-and-stick and space-filling model of caffeine (C₈H₁₀N₄O₂, 194.19 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Caffeine is a purine alkaloid, a fused six- and five-membered ring system with two carbonyls and three N-methyl groups. The ring system is flat, and that flat shape lets caffeine fit adenosine receptors in the brain.

Quick answer: Caffeine is **C₈H₁₀N₄O₂**, molar mass **194.19 g/mol**. Planar around fused rings. Moderately polar. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 2519).

Caffeine at a glance

Formula	C ₈ H ₁₀ N ₄ O ₂
Molar mass	194.19 g/mol
IUPAC name	1,3,7-trimethylpurine-2,6-dione
Atoms / bonds	24 / 25
H-bond donors / acceptors	0 / 3
XLogP3	-0.1
SMILES	<chem>CN1C=NC2=C1C(=O)N(C(=O)N2C)C</chem>
PubChem CID	2519

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Caffeine shows

The model contains **24 atoms** (14 heavy atoms and 10 hydrogens) joined by **25 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as

multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 0 and accept 3 hydrogen bonds, and its PubChem XLogP3 of -0.1 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 58.4 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
fused rings	Planar; ring C and N are sp ²	≈ 120° (≈108° in the five-membered ring)
N-methyl C (×3)	Tetrahedral, sp ³	≈ 109.5°

Is Caffeine polar?

Moderately polar. Soluble in hot water (about 20 g/L at 25 °C, far more when hot), and its carbonyls and ring N accept hydrogen bonds.

Elemental composition of C₈H₁₀N₄O₂

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	8	96.088	49.48%
Hydrogen (H)	10	10.080	5.19%
Nitrogen (N)	4	56.028	28.85%
Oxygen (O)	2	31.998	16.48%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of caffeine

- Stimulant in coffee, tea, cola and energy drinks
- Ingredient in pain relievers and in treatment of apnoea in premature infants

Interesting facts

- Caffeine blocks adenosine receptors, which is why it reduces the feeling of tiredness.
- Its half-life in healthy adults is about 3–7 hours.
- It is structurally related to theobromine (chocolate) and theophylline (tea).

Need identifiers (InChI, InChIKey), computed properties and file downloads? See the [Caffeine structure reference page](#).

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Frequently asked questions

Is caffeine planar?

Its fused purine ring system is planar (sp^2 atoms). Only the hydrogens of the three methyl groups lie out of the plane.

How does caffeine work?

It is shaped like adenosine and blocks adenosine receptors, reducing drowsiness.

What is the chemical formula and molar mass of caffeine?

Caffeine is $C_8H_{10}N_4O_2$ with a molar mass of 194.19 g/mol (PubChem CID 2519). It contains 24 atoms: 8 carbon, 10 hydrogen, 4 nitrogen, 2 oxygen.

What is the IUPAC name of Caffeine?

The PubChem-computed IUPAC name is 1,3,7-trimethylpurine-2,6-dione.

How do I make a model of Caffeine?

Rotate the interactive model above to see how its 24 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Aspirin 3D model $C_9H_8O_4$ **Water 3D model** H_2O **Methane 3D model** CH_4 **Ammonia 3D model** NH_3 **Carbon dioxide 3D model** CO_2 **Oxygen 3D model** O_2 **3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Carbon dioxide Molecule Model - Interactive 3D Structure (CO₂)

<https://www.moldraw.com/molecules/carbon-dioxide.html>

Rotate a 3D ball-and-stick and space-filling model of carbon dioxide (CO₂, 44.009 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Carbon dioxide is a linear molecule, $O=C=O$. Its two polar $C=O$ bonds point in opposite directions, so the molecule as a whole is nonpolar, yet it still absorbs infrared light and acts as a greenhouse gas.

Quick answer: Carbon dioxide is **CO₂**, molar mass **44.009 g/mol**. Linear (AX₂), sp around C. Nonpolar overall. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 280).

Carbon dioxide at a glance

Formula	CO ₂
Molar mass	44.009 g/mol
IUPAC name	carbon dioxide
Atoms / bonds	3 / 2
H-bond donors / acceptors	0 / 2
XLogP3	0.9
SMILES	C(=O)=O
PubChem CID	280

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Carbon dioxide shows

The model contains **3 atoms** (3 heavy atoms and 0 hydrogens) joined by **2 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 0 and accept 2 hydrogen bonds, and its PubChem XLogP3 of 0.9 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 34.1 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C	Linear (AX ₂), sp	O=C=O 180°; C=O 116 pm

Is Carbon dioxide polar?

Nonpolar overall. Each C=O bond is polar, but the dipoles are equal and opposite.

Elemental composition of CO₂

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	1	12.011	27.29%
Oxygen (O)	2	31.998	72.71%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of carbon dioxide

- Carbonated drinks and fire extinguishers
- Dry ice (solid CO₂, sublimates at −78.5 °C) for cooling
- Supercritical CO₂ for decaffeinating coffee and dry cleaning
- Plants fix CO₂ in photosynthesis

Interesting facts

- CO₂ has no liquid phase at 1 atm: the solid sublimates straight to gas.
- Its bending and asymmetric-stretch vibrations absorb infrared radiation, which is why CO₂ is a greenhouse gas.
- Atmospheric CO₂ has risen from about 280 ppm before industrialisation to over 420 ppm today.

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Frequently asked questions

Why is CO₂ linear?

Carbon has two electron domains (two double bonds) and no lone pairs, so they point 180° apart.

If C=O bonds are polar, why is CO₂ nonpolar?

The two bond dipoles are equal and point in exactly opposite directions, so they cancel.

What is the chemical formula and molar mass of carbon dioxide?

Carbon dioxide is CO₂ with a molar mass of 44.009 g/mol (PubChem CID 280). It contains 3 atoms: 1 carbon, 2 oxygen.

What is the IUPAC name of Carbon dioxide?

The PubChem-computed IUPAC name is carbon dioxide.

How do I make a model of Carbon dioxide?

Rotate the interactive model above to see how its 3 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

[Water 3D model](#)[H₂O](#)[Ammonia 3D model](#)[NH₃](#)[Oxygen 3D model](#)[O₂](#)[Ozone 3D model](#)[O₃](#)[Hydrogen chloride 3D model](#)[HCl](#)[Methane 3D model](#)[CH₄](#)[3D molecular model viewer](#)Any molecule by name or SMILES[Build a molecule](#)Molecule builder kit[VSEPR geometry calculator](#)Shapes & bond angles[Molar mass calculator](#)Any formula

Cholesterol Molecule Model - Interactive 3D Structure (C₂₇H₄₆O)

<https://www.moldraw.com/molecules/cholesterol.html>

Rotate a 3D ball-and-stick and space-filling model of cholesterol (C₂₇H₄₆O, 386.7 g/mol).
Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Cholesterol is a steroid. It has four fused rings (three six-membered and one five-membered), a 3β-OH group, a C5=C6 double bond and an eight-carbon side chain. The rigid, nearly flat ring system stiffens cell membranes.

Quick answer: Cholesterol is **C₂₇H₄₆O**, molar mass **386.7 g/mol**. Mostly tetrahedral sp³. Amphipathic: one small polar OH head on a large non-polar hydrocarbon body (XLogP ≈ 8.7). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 5997).

Cholesterol at a glance

Formula	C ₂₇ H ₄₆ O
Molar mass	386.7 g/mol
IUPAC name	(3S,8S,9S,10R,13R,14S,17R)-10,13-dimethyl-17-[(2R)-6-methylheptan-2-yl]-2,3,4,7,8,9,11,12,14,15,16,17-dodecahydro-1H-cyclopenta[a]phenanthren-3-ol
Atoms / bonds	74 / 77
H-bond donors / acceptors	1 / 1
XLogP3	8.7
SMILES	<chem>C[C@H](CCCC(C)C)[C@H]1CC[C@@H]2[C@@]1(CC[C@H]3[C@H]2CC=C4[C@@]3(CC[C@@H](C4)O)C)C</chem>
PubChem CID	5997

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Cholesterol shows

The model contains **74 atoms** (28 heavy atoms and 46 hydrogens) joined by **77 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 1 hydrogen bonds, and its PubChem XLogP3 of 8.7 means it is fat-loving (lipophilic). Its topological polar surface area is 20.2 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring carbons	Mostly tetrahedral sp ³ ; trans-fused chair rings form a flat, rigid plate	≈ 109.5°

Atom(s)	Geometry / hybridisation	Angles & lengths
C5=C6	Trigonal planar, sp ²	≈ 120°

Is Cholesterol polar?

Amphipathic: one small polar OH head on a large non-polar hydrocarbon body (XLogP ≈ 8.7).

Elemental composition of C₂₇H₄₆O

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	27	324.297	83.87%
Hydrogen (H)	46	46.368	11.99%
Oxygen (O)	1	15.999	4.14%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of cholesterol

- Component of animal cell membranes (fluidity control)
- Precursor of steroid hormones, bile acids and vitamin D
- Carried in blood by LDL and HDL lipoproteins

Interesting facts

- Cholesterol has 8 stereocentres, so 256 stereoisomers are possible, but nature makes only one.
- The liver makes most of the body's cholesterol. Statins block HMG-CoA reductase in that pathway.
- Its OH sits at the membrane surface while the rings slot between phospholipid tails.

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Frequently asked questions

What is the structure of cholesterol?

Four fused rings (the steroid nucleus), a hydroxyl at C3, a double bond at C5–C6, and an alkyl side chain at C17.

Is cholesterol polar?

Mostly non-polar. Only its single OH group is polar, so it is amphipathic and insoluble in water.

What is the chemical formula and molar mass of cholesterol?

Cholesterol is C₂₇H₄₆O with a molar mass of 386.7 g/mol (PubChem CID 5997). It contains 74 atoms: 27 carbon, 46 hydrogen, 1 oxygen.

What is the IUPAC name of Cholesterol?

The PubChem-computed IUPAC name is (3S,8S,9S,10R,13R,14S,17R)-10,13-dimethyl-17-[(2R)-6-methylheptan-2-yl]-2,3,4,7,8,9,11,12,14,15,16,17-dodecahydro-1H-cyclopenta[a]phenanthren-3-ol.

How do I make a model of Cholesterol?

With 74 atoms, Cholesterol is a big kit build. Use the interactive model above as your guide, build the ring or core framework first, then add the side groups and finally the hydrogens.

More molecule models & tools

Testosterone 3D modelC₁₉H₂₈O₂**Estradiol (estrogen) 3D model**C₁₈H₂₄O₂**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Citric acid Molecule Model - Interactive 3D Structure (C₆H₈O₇)

<https://www.moldraw.com/molecules/citric-acid.html>

Rotate a 3D ball-and-stick and space-filling model of citric acid (C₆H₈O₇, 192.12 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Citric acid is a tricarboxylic acid with three COOH groups and one OH on a five-carbon backbone. It gives lemons their sour taste and is central to the citric acid (Krebs) cycle.

Quick answer: Citric acid is **C₆H₈O₇**, molar mass **192.12 g/mol**. Tetrahedral, sp³ around central C3. Very polar: three acid groups and one OH make it highly water-soluble. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 311).

Citric acid at a glance

Formula	C ₆ H ₈ O ₇
Molar mass	192.12 g/mol
IUPAC name	2-hydroxypropane-1,2,3-tricarboxylic acid
Atoms / bonds	21 / 20
H-bond donors / acceptors	4 / 7

XLogP3	-1.7
SMILES	<chem>C(C(=O)O)C(CC(=O)O)(C(=O)O)O</chem>
PubChem CID	311

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Citric acid shows

The model contains **21 atoms** (13 heavy atoms and 8 hydrogens) joined by **20 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 4 and accept 7 hydrogen bonds, and its PubChem XLogP3 of -1.7 means it is very water-loving (hydrophilic). Its topological polar surface area is 132 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
central C3	Tetrahedral, sp ³	≈ 109.5°
carboxyl C (×3)	Trigonal planar, sp ²	≈ 120°

Is Citric acid polar?

Very polar: three acid groups and one OH make it highly water-soluble.

Elemental composition of C₆H₈O₇

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	6	72.066	37.51%
Hydrogen (H)	8	8.064	4.20%
Oxygen (O)	7	111.993	58.29%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of citric acid

- Food acidulant and preservative (E330)
- Chelating agent in cleaners and descalers
- Buffer in drinks, cosmetics and medicines

Interesting facts

- Citric acid is triprotic with pKa values of about 3.13, 4.76 and 6.40.
- Lemon and lime juice contain about 5–6% citric acid.
- Its anion, citrate, is the first intermediate in the Krebs cycle.

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Frequently asked questions

How many acidic hydrogens does citric acid have?

Three, one per carboxyl group ($pK_a \approx 3.1, 4.8$ and 6.4). The OH hydrogen is not acidic in water.

Is citric acid chiral?

No. Its central carbon carries two identical CH_2COOH groups, so it is achiral.

What is the chemical formula and molar mass of citric acid?

Citric acid is $\text{C}_6\text{H}_8\text{O}_7$ with a molar mass of 192.12 g/mol (PubChem CID 311). It contains 21 atoms: 6 carbon, 8 hydrogen, 7 oxygen.

What is the IUPAC name of Citric acid?

The PubChem-computed IUPAC name is 2-hydroxypropane-1,2,3-tricarboxylic acid.

How do I make a model of Citric acid?

Rotate the interactive model above to see how its 21 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

[Glycine 3D model](#) $\text{C}_2\text{H}_5\text{NO}_2$ [Glycerol 3D model](#) $\text{C}_3\text{H}_8\text{O}_3$ [Vitamin C \(ascorbic acid\) 3D model](#) $\text{C}_6\text{H}_8\text{O}_6$ [ATP \(adenosine triphosphate\) 3D model](#) $\text{C}_{10}\text{H}_{16}\text{N}_5\text{O}_{13}\text{P}_3$ [Water 3D model](#) H_2O [Methane 3D model](#) CH_4 [3D molecular model viewer](#)Any molecule by name or SMILES[Build a molecule](#)Molecule builder kit[VSEPR geometry calculator](#)Shapes & bond angles[Molar mass calculator](#)Any formula

Estradiol Molecule Model - Interactive 3D Structure (C₁₈H₂₄O₂)

<https://www.moldraw.com/molecules/estradiol.html>

Rotate a 3D ball-and-stick and space-filling model of estradiol (C₁₈H₂₄O₂, 272.4 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Estradiol is the most potent natural estrogen. Unlike other steroids, its ring A is an aromatic phenol, and it has a $17\beta\text{-OH}$ on the five-membered ring D.

Quick answer: Estradiol is **C₁₈H₂₄O₂**, molar mass **272.4 g/mol**. Planar aromatic, sp² around ring A. Mostly non-polar (XLogP ≈ 4), with hydrogen-bonding OH groups at each end that anchor it in the estrogen receptor. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 5757).

Estradiol at a glance

Formula	C ₁₈ H ₂₄ O ₂
Molar mass	272.4 g/mol
IUPAC name	(8R,9S,13S,14S,17S)-13-methyl-6,7,8,9,11,12,14,15,16,17-decahydrocyclopenta[a]phenanthrene-3,17-diol
Atoms / bonds	44 / 47
H-bond donors / acceptors	2 / 2
XLogP3	4
SMILES	<chem>C[C@]12CC[C@H]3[C@H]([C@@H]1CC[C@@H]2O)CCC4=C3C=CC(=C4)O</chem>
PubChem CID	5757

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Estradiol shows

The model contains **44 atoms** (20 heavy atoms and 24 hydrogens) joined by **47 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 2 and accept 2 hydrogen bonds, and its PubChem XLogP3 of 4 means it is fat-loving (lipophilic). Its topological polar surface area is 40.5 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring A	Planar aromatic, sp ²	120°
rings B-D	sp ³ chair/envelope rings	≈ 109.5°

Is Estradiol polar?

Mostly non-polar (XLogP ≈ 4), with hydrogen-bonding OH groups at each end that anchor it in the estrogen receptor.

Elemental composition of C₁₈H₂₄O₂

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	18	216.198	79.37%
Hydrogen (H)	24	24.192	8.88%

Element	Atoms	Mass (g/mol)	Mass %
Oxygen (O)	2	31.998	11.75%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of estradiol

- Female sex hormone (menstrual cycle, bone health)
- Hormone replacement therapy and contraceptives (ethinylestradiol)

Interesting facts

- The two OH groups are about 11 Å apart, a distance the estrogen receptor recognises.
- Estradiol is made from testosterone by the enzyme aromatase.
- "Estrogen" is a class of hormones (estrone, estradiol, estriol). Estradiol is the strongest.

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Frequently asked questions

Why is ring A of estradiol aromatic?

Aromatase removes the C19 methyl group and aromatises ring A of testosterone, giving a phenol.

Is estrogen the same as estradiol?

Estrogen is a group of hormones. Estradiol (E2) is the main and most potent one.

What is the chemical formula and molar mass of estradiol?

Estradiol is C₁₈H₂₄O₂ with a molar mass of 272.4 g/mol (PubChem CID 5757). It contains 44 atoms: 18 carbon, 24 hydrogen, 2 oxygen.

What is the IUPAC name of Estradiol?

The PubChem-computed IUPAC name is (8R,9S,13S,14S,17S)-13-methyl-6,7,8,9,11,12,14,15,16,17-decahydrocyclopenta[a]phenanthrene-3,17-diol.

How do I make a model of Estradiol?

With 44 atoms, Estradiol is a big kit build. Use the interactive model above as your guide, build the ring or core framework first, then add the side groups and finally the hydrogens.

More molecule models & tools

Cholesterol 3D modelC27H46O**Testosterone 3D model**C19H28O2**Water 3D model**H2O**Methane 3D model**CH4**Ammonia 3D model**NH3**Carbon dioxide 3D model**CO2**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Ethanol Molecule Model - Interactive 3D Structure (C₂H₆O)

<https://www.moldraw.com/molecules/ethanol.html>

Rotate a 3D ball-and-stick and space-filling model of ethanol (C₂H₆O, 46.07 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Ethanol is the alcohol in drinks, hand sanitisers and biofuel. Its two-carbon chain ends in a hydroxyl group. Both carbons are tetrahedral and the oxygen is bent, so the molecule is polar but still has a non-polar ethyl end.

Quick answer: Ethanol is **C₂H₆O**, molar mass **46.07 g/mol**. Tetrahedral, sp³ around C (×2). Polar (about 1.69 D). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 702).

Ethanol at a glance

Formula	C ₂ H ₆ O
Molar mass	46.07 g/mol
IUPAC name	ethanol
Atoms / bonds	9 / 8
H-bond donors / acceptors	1 / 1
XLogP3	-0.1
SMILES	CCO
PubChem CID	702

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Ethanol shows

The model contains **9 atoms** (3 heavy atoms and 6 hydrogens) joined by **8 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 1 hydrogen bonds, and its PubChem XLogP3 of -0.1 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 20.2 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C (×2)	Tetrahedral, sp ³	≈ 109.5°
O	Bent, sp ³	C-O-H ≈ 108.5°

Is Ethanol polar?

Polar (about 1.69 D). It mixes with water in any proportion and also dissolves many non-polar compounds.

Elemental composition of C₂H₆O

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	2	24.022	52.14%
Hydrogen (H)	6	6.048	13.13%
Oxygen (O)	1	15.999	34.73%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of ethanol

- Alcoholic beverages (made by yeast fermentation)
- Fuel additive (E10, E85) and biofuel
- Solvent, disinfectant (60–80% kills many microbes) and antiseptic

Interesting facts

- Ethanol and dimethyl ether share the formula C₂H₆O. They are structural isomers with very different properties.
- Pure ethanol boils at 78.4 °C. Water and ethanol form an azeotrope at about 95.6% ethanol.
- The liver oxidises ethanol to acetaldehyde and then to acetic acid.

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Frequently asked questions

What is the structure of ethanol?

CH₃-CH₂-OH: two sp³ carbons in a chain, with an OH group on the second carbon. Its SMILES is CCO.

Is ethanol polar or nonpolar?

Polar, because of the O-H group, but its CH₃CH₂ part is non-polar. That is why it dissolves both water-soluble and oily substances.

What is the chemical formula and molar mass of ethanol?

Ethanol is C₂H₆O with a molar mass of 46.07 g/mol (PubChem CID 702). It contains 9 atoms: 2 carbon, 6 hydrogen, 1 oxygen.

What is the IUPAC name of Ethanol?

The PubChem-computed IUPAC name is ethanol.

How do I make a model of Ethanol?

Rotate the interactive model above to see how its 9 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Methanol 3D modelCH₄O**Acetone 3D model**C₃H₆O**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Fructose Molecule Model - Interactive 3D Structure (C₆H₁₂O₆)

<https://www.moldraw.com/molecules/fructose.html>

Rotate a 3D ball-and-stick and space-filling model of fructose (C₆H₁₂O₆, 180.16 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Fructose, or fruit sugar, is a ketohexose. It has the same formula as glucose but a C=O at carbon 2 instead of carbon 1. In solution it cyclises mainly to pyranose and furanose rings.

Quick answer: Fructose is **C₆H₁₂O₆**, molar mass **180.16 g/mol**. Tetrahedral, sp³. Very polar and highly soluble: fructose is the most water-soluble common sugar. Atom labels
Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 2723872).

Fructose at a glance

Formula	C ₆ H ₁₂ O ₆
Molar mass	180.16 g/mol
IUPAC name	(3S,4R,5R)-2-(hydroxymethyl)oxane-2,3,4,5-tetrol

Atoms / bonds	24 / 24
H-bond donors / acceptors	5 / 6
XLogP3	-2.8
SMILES	<chem>C1[C@H]([C@H]([C@@H](C(O1)(CO)O)O)O)O</chem>
PubChem CID	2723872

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Fructose shows

The model contains **24 atoms** (12 heavy atoms and 12 hydrogens) joined by **24 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 5 and accept 6 hydrogen bonds, and its PubChem XLogP3 of -2.8 means it is very water-loving (hydrophilic). Its topological polar surface area is 110 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring/chain C	Tetrahedral, sp ³	≈ 109.5°
C2 (open chain)	Trigonal planar, sp ² ketone	≈ 120°

Is Fructose polar?

Very polar and highly soluble: fructose is the most water-soluble common sugar.

Elemental composition of C₆H₁₂O₆

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	6	72.066	40.00%
Hydrogen (H)	12	12.096	6.71%
Oxygen (O)	6	95.994	53.28%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of fructose

- Sweetener (about 1.2–1.8× as sweet as sucrose)
- Half of sucrose and a component of high-fructose corn syrup
- Honey and fruits

Interesting facts

- Glucose (an aldose) and fructose (a ketose) are structural isomers.

- In sucrose, fructose is present as a five-membered furanose ring.
- Fructose is metabolised mainly in the liver.

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Frequently asked questions

How is fructose different from glucose?

Both are $C_6H_{12}O_6$, but fructose is a ketose ($C=O$ at C2) and glucose an aldose (CHO at C1). They also form different ring sizes.

What ring does fructose form?

Mainly a six-membered β -pyranose in water, and a five-membered furanose when bound in sucrose.

What is the chemical formula and molar mass of fructose?

Fructose is $C_6H_{12}O_6$ with a molar mass of 180.16 g/mol (PubChem CID 2723872). It contains 24 atoms: 6 carbon, 12 hydrogen, 6 oxygen.

What is the IUPAC name of Fructose?

The PubChem-computed IUPAC name is (3S,4R,5R)-2-(hydroxymethyl)oxane-2,3,4,5-tetrol.

How do I make a model of Fructose?

Rotate the interactive model above to see how its 24 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

[Glucose 3D model](#) $C_6H_{12}O_6$ [Sucrose 3D model](#) $C_{12}H_{22}O_{11}$ [Water 3D model](#) H_2O [Methane 3D model](#) CH_4 [Ammonia 3D model](#) NH_3 [Carbon dioxide 3D model](#) CO_2 [3D molecular model viewer](#)Any molecule by name or SMILES[Build a molecule](#)Molecule builder kit[VSEPR geometry calculator](#)Shapes & bond angles[Molar mass calculator](#)Any formula

Glucose Molecule Model - Interactive 3D Structure ($C_6H_{12}O_6$)

<https://www.moldraw.com/molecules/glucose.html>

Rotate a 3D ball-and-stick and space-filling model of glucose ($C_6H_{12}O_6$, 180.16 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Glucose is the main energy sugar of living cells. In solution it exists mostly as a six-membered pyranose ring in the chair conformation, with almost all OH groups equatorial.

That makes it one of the most stable sugars.

Quick answer: Glucose is **C₆H₁₂O₆**, molar mass **180.16 g/mol**. Tetrahedral, sp³. Very polar: five OH groups make glucose highly water-soluble (about 900 g/L at 25 °C). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 5793).

Glucose at a glance

Formula	C ₆ H ₁₂ O ₆
Molar mass	180.16 g/mol
IUPAC name	(3R,4S,5S,6R)-6-(hydroxymethyl)oxane-2,3,4,5-tetrol
Atoms / bonds	24 / 24
H-bond donors / acceptors	5 / 6
XLogP3	-2.6
SMILES	C([C@@H]1[C@H]([C@@H]([C@H](C(O1)O)O)O)O)O
PubChem CID	5793

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Glucose shows

The model contains **24 atoms** (12 heavy atoms and 12 hydrogens) joined by **24 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 5 and accept 6 hydrogen bonds, and its PubChem XLogP3 of -2.6 means it is very water-loving (hydrophilic). Its topological polar surface area is 110 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring C (×5) and C6	Tetrahedral, sp ³ ; ring in chair conformation	≈ 109.5°
ring O	Bent, sp ³	C-O-C ≈ 113°

Is Glucose polar?

Very polar: five OH groups make glucose highly water-soluble (about 900 g/L at 25 °C).

Elemental composition of C₆H₁₂O₆

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	6	72.066	40.00%
Hydrogen (H)	12	12.096	6.71%

Element	Atoms	Mass (g/mol)	Mass %
Oxygen (O)	6	95.994	53.28%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of glucose

- Primary fuel for cellular respiration (glycolysis)
- Building block of starch, glycogen and cellulose
- IV fluids and food/energy products (dextrose)

Interesting facts

- In water, D-glucose is about 64% β -pyranose, 36% α -pyranose and under 1% open-chain aldehyde.
- β -D-glucose is the only common aldohexose with every substituent equatorial in the chair.
- Aerobic respiration: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$.

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Frequently asked questions

What shape is a glucose molecule?

A six-membered ring (five carbons and one oxygen) in a puckered chair conformation, with the OH groups pointing outward (equatorial).

What is the difference between α - and β -glucose?

The orientation of the OH on carbon 1 (the anomeric carbon): axial (down) in α and equatorial (up) in β .

What is the chemical formula and molar mass of glucose?

Glucose is $\text{C}_6\text{H}_{12}\text{O}_6$ with a molar mass of 180.16 g/mol (PubChem CID 5793). It contains 24 atoms: 6 carbon, 12 hydrogen, 6 oxygen.

What is the IUPAC name of Glucose?

The PubChem-computed IUPAC name is (3R,4S,5S,6R)-6-(hydroxymethyl)oxane-2,3,4,5-tetrol.

How do I make a model of Glucose?

Rotate the interactive model above to see how its 24 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Sucrose 3D modelC12H22O11 **Fructose 3D model**C6H12O6 **Water 3D model**H2O **Methane 3D model**CH4 **Ammonia 3D model**NH3 **Carbon dioxide 3D model**CO2 **3D molecular model viewer** Any molecule by name or SMILES **Build a molecule** Molecule builder kit **VSEPR geometry calculator** Shapes & bond angles **Molar mass calculator** Any formula

Glycerol Molecule Model - Interactive 3D Structure (C3H8O3)

<https://www.moldraw.com/molecules/glycerol.html>

Rotate a 3D ball-and-stick and space-filling model of glycerol (C3H8O3, 92.09 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Glycerol (propane-1,2,3-triol) is a three-carbon chain with an OH group on every carbon. It forms the backbone of fats and oils (triglycerides) and is a sweet, viscous liquid.

Quick answer: Glycerol is **C₃H₈O₃**, molar mass **92.09 g/mol**. Tetrahedral, sp³ around C (×3). Very polar and hygroscopic. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 753).

Glycerol at a glance

Formula	C ₃ H ₈ O ₃
Molar mass	92.09 g/mol
IUPAC name	propane-1,2,3-triol
Atoms / bonds	14 / 13
H-bond donors / acceptors	3 / 3
XLogP3	-1.8
SMILES	<chem>C(C(CO)O)O</chem>
PubChem CID	753

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Glycerol shows

The model contains **14 atoms** (6 heavy atoms and 8 hydrogens) joined by **13 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 3 and accept

3 hydrogen bonds, and its PubChem XLogP3 of -1.8 means it is very water-loving (hydrophilic). Its topological polar surface area is 60.7 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C (×3)	Tetrahedral, sp ³	≈ 109.5°
O (×3)	Bent, sp ³	C-O-H ≈ 108°

Is Glycerol polar?

Very polar and hygroscopic. Three OH groups give extensive hydrogen bonding and high viscosity.

Elemental composition of C₃H₈O₃

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	3	36.033	39.13%
Hydrogen (H)	8	8.064	8.76%
Oxygen (O)	3	47.997	52.12%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of glycerol

- Backbone of triglycerides and phospholipids
- Humectant in cosmetics, toothpaste and food (E422)
- Starting material for nitroglycerin

Interesting facts

- Glycerol boils at 290 °C, very high for such a small molecule, because of hydrogen bonding.
- It is a by-product of soap making and of biodiesel production.
- Glycerol is about 60% as sweet as sucrose.

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Frequently asked questions

What is the structure of glycerol?

HOCH₂-CH(OH)-CH₂OH: three sp³ carbons, each carrying one hydroxyl group.

Why is glycerol so viscous?

Each molecule forms several hydrogen bonds through its three OH groups, which strongly hinders flow.

What is the chemical formula and molar mass of glycerol?

Glycerol is C₃H₈O₃ with a molar mass of 92.09 g/mol (PubChem CID 753). It contains 14 atoms: 3 carbon, 8 hydrogen, 3 oxygen.

What is the IUPAC name of Glycerol?

The PubChem-computed IUPAC name is propane-1,2,3-triol.

How do I make a model of Glycerol?

Rotate the interactive model above to see how its 14 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Glycine 3D modelC₂H₅NO₂**Citric acid 3D model**C₆H₈O₇**Vitamin C (ascorbic acid) 3D model**C₆H₈O₆**ATP (adenosine triphosphate) 3D model**C₁₀H₁₆N₅O₁₃P₃**Water 3D model**H₂O**Methane 3D model**CH₄**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Glycine Molecule Model - Interactive 3D Structure (C₂H₅NO₂)

<https://www.moldraw.com/molecules/glycine.html>

Rotate a 3D ball-and-stick and space-filling model of glycine (C₂H₅NO₂, 75.07 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Glycine is the smallest amino acid. Its side chain is just a hydrogen atom, so it is the only common amino acid that is not chiral. In water and in crystals it exists as a zwitterion, ⁺H₃N-CH₂-COO⁻.

Quick answer: Glycine is **C₂H₅NO₂**, molar mass **75.07 g/mol**. Tetrahedral, sp³ around α-carbon. Very polar: a zwitterion at neutral pH, highly soluble in water. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 750).

Glycine at a glance

Formula	C ₂ H ₅ NO ₂
Molar mass	75.07 g/mol

IUPAC name	2-aminoacetic acid
Atoms / bonds	10 / 9
H-bond donors / acceptors	2 / 3
XLogP3	-3.2
SMILES	<chem>C(C(=O)O)N</chem>
PubChem CID	750

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Glycine shows

The model contains **10 atoms** (5 heavy atoms and 5 hydrogens) joined by **9 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 2 and accept 3 hydrogen bonds, and its PubChem XLogP3 of -3.2 means it is very water-loving (hydrophilic). Its topological polar surface area is 63.3 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
α-carbon	Tetrahedral, sp ³	≈ 109.5°
carboxyl C	Trigonal planar, sp ²	≈ 120°

Is Glycine polar?

Very polar: a zwitterion at neutral pH, highly soluble in water.

Elemental composition of C₂H₅NO₂

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	2	24.022	32.00%
Hydrogen (H)	5	5.040	6.71%
Nitrogen (N)	1	14.007	18.66%
Oxygen (O)	2	31.998	42.63%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of glycine

- Protein building block (about every third residue in collagen)
- Inhibitory neurotransmitter in the spinal cord
- Food additive and buffering agent

Interesting facts

- Glycine is achiral because its α -carbon carries two hydrogens.
- Collagen's repeating Gly-X-Y pattern lets its triple helix pack tightly.
- Glycine has been detected in comet samples returned by NASA's Stardust mission.

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Frequently asked questions

Why is glycine not chiral?

Its α -carbon is bonded to two identical hydrogen atoms, so it has no stereocentre.

What is the zwitterion form of glycine?

$^+\text{H}_3\text{N}-\text{CH}_2-\text{COO}^-$: the amine is protonated and the acid deprotonated. This is the main form at neutral pH.

What is the chemical formula and molar mass of glycine?

Glycine is $\text{C}_2\text{H}_5\text{NO}_2$ with a molar mass of 75.07 g/mol (PubChem CID 750). It contains 10 atoms: 2 carbon, 5 hydrogen, 1 nitrogen, 2 oxygen.

What is the IUPAC name of Glycine?

The PubChem-computed IUPAC name is 2-aminoacetic acid.

How do I make a model of Glycine?

Rotate the interactive model above to see how its 10 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Glycerol 3D model $\text{C}_3\text{H}_8\text{O}_3$ **Citric acid 3D model** $\text{C}_6\text{H}_8\text{O}_7$ **Vitamin C (ascorbic acid) 3D model** $\text{C}_6\text{H}_8\text{O}_6$ **ATP (adenosine triphosphate) 3D model** $\text{C}_{10}\text{H}_{16}\text{N}_5\text{O}_{13}\text{P}_3$ **Water 3D model** H_2O **Methane 3D model** CH_4 **3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Hydrogen chloride Molecule Model - Interactive 3D Structure (HCl)

<https://www.moldraw.com/molecules/hydrogen-chloride.html>

Rotate a 3D ball-and-stick and space-filling model of hydrogen chloride (HCl, 36.46 g/mol).
Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Hydrogen chloride is a polar diatomic molecule. Dissolved in water it ionises completely to hydrochloric acid, one of the most important strong acids in chemistry and in your stomach.

Quick answer: Hydrogen chloride is **HCl**, molar mass **36.46 g/mol**. Linear diatomic around H-Cl. Polar (about 1.08 D). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 313).

Hydrogen chloride at a glance

Formula	HCl
Molar mass	36.46 g/mol
IUPAC name	chlorane
Atoms / bonds	2 / 1
H-bond donors / acceptors	1 / 0
XLogP3	0.8
SMILES	Cl
PubChem CID	313

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Hydrogen chloride shows

The model contains **2 atoms** (1 heavy atom and 1 hydrogen) joined by **1 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 0 hydrogen bonds, and its PubChem XLogP3 of 0.8 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 0 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
H-Cl	Linear diatomic	H-Cl bond length 127.5 pm

Is Hydrogen chloride polar?

Polar (about 1.08 D). Chlorine (EN 3.16) pulls electron density from hydrogen (EN 2.20).

Elemental composition of HCl

Element	Atoms	Mass (g/mol)	Mass %
Hydrogen (H)	1	1.008	2.76%
Chlorine (Cl)	1	35.450	97.24%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of hydrogen chloride

- Hydrochloric acid for pickling steel and adjusting pH
- Production of PVC precursors and inorganic chlorides
- Gastric acid (about pH 1.5–3.5) helps digestion

Interesting facts

- Concentrated hydrochloric acid is about 37% HCl by mass.
- HCl is a gas at room temperature (bp $-85\text{ }^{\circ}\text{C}$). Hydrochloric acid is its solution in water.
- In water it fully donates its proton: $\text{HCl} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$.

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Frequently asked questions

Is HCl polar or nonpolar?

Polar. The H–Cl bond has a large electronegativity difference, and with only two atoms nothing can cancel the dipole.

What is the difference between hydrogen chloride and hydrochloric acid?

Hydrogen chloride is the HCl molecule (a gas). Hydrochloric acid is HCl dissolved in water, where it exists as H_3O^+ and Cl^- .

What is the chemical formula and molar mass of hydrogen chloride?

Hydrogen chloride is HCl with a molar mass of 36.46 g/mol (PubChem CID 313). It contains 2 atoms: 1 chlorine, 1 hydrogen.

What is the IUPAC name of Hydrogen chloride?

The PubChem-computed IUPAC name is chlorane.

How do I make a model of Hydrogen chloride?

Rotate the interactive model above to see how its 2 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

[Water 3D model](#)[H₂O](#)[Ammonia 3D model](#)[NH₃](#)[Carbon dioxide 3D model](#)[CO₂](#)[Oxygen 3D model](#)[O₂](#)[Ozone 3D model](#)[O₃](#)[Methane 3D model](#)[CH₄](#)[3D molecular model viewer](#)Any

Melatonin Molecule Model - Interactive 3D Structure (C₁₃H₁₆N₂O₂)

<https://www.moldraw.com/molecules/melatonin.html>

Rotate a 3D ball-and-stick and space-filling model of melatonin (C₁₃H₁₆N₂O₂, 232.28 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Melatonin is the sleep hormone. Made from serotonin, it has an indole ring with a 5-methoxy group and an N-acetylated ethylamine chain, which makes it less polar and able to cross membranes easily.

Quick answer: Melatonin is **C₁₃H₁₆N₂O₂**, molar mass **232.28 g/mol**. Planar aromatic, sp² around indole ring. Moderately polar but lipophilic enough (XLogP ≈ 0.8) to cross the blood-brain barrier. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 896).

Melatonin at a glance

Formula	C ₁₃ H ₁₆ N ₂ O ₂
Molar mass	232.28 g/mol
IUPAC name	N-[2-(5-methoxy-1H-indol-3-yl)ethyl]acetamide
Atoms / bonds	33 / 34
H-bond donors / acceptors	2 / 2
XLogP3	0.8
SMILES	<chem>CC(=O)NCCC1=CNC2=C1C=C(C=C2)OC</chem>
PubChem CID	896

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Melatonin shows

The model contains **33 atoms** (17 heavy atoms and 16 hydrogens) joined by **34 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 2 and accept 2 hydrogen bonds, and its PubChem XLogP3 of 0.8 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 54.1 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
indole ring	Planar aromatic, sp ²	≈ 120°
amide C=O	Trigonal planar, sp ² ; planar amide	≈ 120°

Is Melatonin polar?

Moderately polar but lipophilic enough (XLogP ≈ 0.8) to cross the blood-brain barrier.

Elemental composition of C₁₃H₁₆N₂O₂

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	13	156.143	67.22%
Hydrogen (H)	16	16.128	6.94%
Nitrogen (N)	2	28.014	12.06%
Oxygen (O)	2	31.998	13.78%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of melatonin

- Regulates the circadian rhythm (sleep-wake cycle)
- Dietary supplement for jet lag and sleep onset
- Antioxidant

Interesting facts

- The pineal gland secretes melatonin mainly at night, and blue light suppresses it.
- It is made from serotonin by N-acetylation and then O-methylation.
- Melatonin is also found in plants, where it acts as an antioxidant.

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Frequently asked questions

How is melatonin related to serotonin?

Serotonin is acetylated on its amine and methylated on its 5-OH to make melatonin.

Is melatonin a steroid?

No. It is an indoleamine, derived from the amino acid tryptophan.

What is the chemical formula and molar mass of melatonin?

Melatonin is C₁₃H₁₆N₂O₂ with a molar mass of 232.28 g/mol (PubChem CID 896). It contains 33 atoms: 13 carbon, 16 hydrogen, 2 nitrogen, 2 oxygen.

What is the IUPAC name of Melatonin?

The PubChem-computed IUPAC name is N-[2-(5-methoxy-1H-indol-3-yl)ethyl]acetamide.

How do I make a model of Melatonin?

With 33 atoms, Melatonin is a big kit build. Use the interactive model above as your guide, build the ring or core framework first, then add the side groups and finally the hydrogens.

More molecule models & tools

Serotonin 3D modelC₁₀H₁₂N₂O**Adrenaline (epinephrine) 3D model**C₉H₁₃NO₃**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Methane Molecule Model - Interactive 3D Structure (CH₄)

<https://www.moldraw.com/molecules/methane.html>

Rotate a 3D ball-and-stick and space-filling model of methane (CH₄, 16.043 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Methane is the textbook tetrahedral molecule: one carbon bonded to four hydrogens, with every H-C-H angle exactly 109.5°. It is the main component of natural gas and a potent greenhouse gas.

Quick answer: Methane is **CH₄**, molar mass **16.043 g/mol**. Tetrahedral (AX₄), sp³ around C. Nonpolar. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 297).

Methane at a glance

Formula	CH ₄
Molar mass	16.043 g/mol
IUPAC name	methane
Atoms / bonds	5 / 4
H-bond donors / acceptors	0 / 0
XLogP3	0.6
SMILES	C

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Methane shows

The model contains **5 atoms** (1 heavy atom and 4 hydrogens) joined by **4 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It has no hydrogen-bond donors or acceptors, so it interacts mainly through weak London dispersion forces, and its PubChem XLogP3 of 0.6 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 0 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C	Tetrahedral (AX ₄), sp ³	H-C-H 109.5°; C-H 108.7 pm

Is Methane polar?

Nonpolar. The C-H bonds are only weakly polar, and the symmetric tetrahedron cancels them completely.

Elemental composition of CH₄

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	1	12.011	74.87%
Hydrogen (H)	4	4.032	25.13%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of methane

- Main component of natural gas (fuel for heating and power)
- Feedstock for hydrogen and syngas (steam reforming)
- Starting material for methanol, chloromethanes and hydrogen cyanide

Interesting facts

- Molecule for molecule, methane traps far more heat than CO₂: its 100-year global warming potential is about 28–30.
- Methane boils at −161.5 °C, so natural gas is shipped as a cryogenic liquid (LNG).
- Methane hydrate ("fire ice") traps methane inside cages of frozen water on the sea floor.

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Frequently asked questions

Why is methane tetrahedral?

Carbon has four bonding pairs and no lone pairs. Four electron domains spread out as far as possible to the corners of a tetrahedron, at 109.5°.

Is methane polar or nonpolar?

Nonpolar. The four identical C-H bonds point symmetrically, so their small dipoles cancel.

What is the chemical formula and molar mass of methane?

Methane is CH₄ with a molar mass of 16.043 g/mol (PubChem CID 297). It contains 5 atoms: 1 carbon, 4 hydrogen.

What is the IUPAC name of Methane?

The PubChem-computed IUPAC name is methane.

How do I make a model of Methane?

Rotate the interactive model above to see how its 5 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

[Propane 3D model](#)[C₃H₈](#)[Benzene 3D model](#)[C₆H₆](#)[Water 3D model](#)[H₂O](#)[Ammonia 3D model](#)[NH₃](#)[Carbon dioxide 3D model](#)[CO₂](#)[Oxygen 3D model](#)[O₂](#)[3D molecular model viewer](#)Any molecule by name or SMILES[Build a molecule](#)Molecule builder kit[VSEPR geometry calculator](#)Shapes & bond angles[Molar mass calculator](#)Any formula

Methanol Molecule Model - Interactive 3D Structure (CH₄O)

<https://www.moldraw.com/molecules/methanol.html>

Rotate a 3D ball-and-stick and space-filling model of methanol (CH₄O, 32.042 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Methanol is the simplest alcohol: a methyl group joined to a hydroxyl group. Carbon is tetrahedral and oxygen is bent, and the O-H group makes methanol fully miscible with water.

Quick answer: Methanol is **CH₄O**, molar mass **32.042 g/mol**. Tetrahedral, sp³ around C. Polar (about 1.7 D) and able to hydrogen bond, both as a donor (O-H) and an acceptor (O lone pairs). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 887).

Methanol at a glance

Formula	CH ₄ O
Molar mass	32.042 g/mol
IUPAC name	methanol
Atoms / bonds	6 / 5
H-bond donors / acceptors	1 / 1
XLogP3	-0.5
SMILES	C0
PubChem CID	887

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Methanol shows

The model contains **6 atoms** (2 heavy atoms and 4 hydrogens) joined by **5 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 1 hydrogen bonds, and its PubChem XLogP3 of -0.5 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 20.2 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C	Tetrahedral, sp ³	H-C-O ≈ 109.5°
O	Bent, sp ³ (two lone pairs)	C-O-H ≈ 108.5°

Is Methanol polar?

Polar (about 1.7 D) and able to hydrogen bond, both as a donor (O-H) and an acceptor (O lone pairs).

Elemental composition of CH₄O

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	1	12.011	37.49%
Hydrogen (H)	4	4.032	12.58%
Oxygen (O)	1	15.999	49.93%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of methanol

- Feedstock for formaldehyde, acetic acid and MTBE
- Solvent and antifreeze (windshield washer fluid)
- Fuel and hydrogen carrier

Interesting facts

- Methanol is highly toxic: the body oxidises it to formaldehyde and formic acid, which can cause blindness.
- It used to be called "wood alcohol" because it was made by distilling wood.
- Methanol boils at 64.7 °C, much higher than ethane, because of hydrogen bonding.

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Frequently asked questions

What is the shape of methanol?

Carbon is tetrahedral (sp^3) and oxygen is bent (two bonds plus two lone pairs), with a C-O-H angle of about 108.5°.

Is methanol polar?

Yes. The O-H and C-O bonds are polar and the shape is unsymmetrical, so methanol has a dipole and forms hydrogen bonds.

What is the chemical formula and molar mass of methanol?

Methanol is CH_4O with a molar mass of 32.042 g/mol (PubChem CID 887). It contains 6 atoms: 1 carbon, 4 hydrogen, 1 oxygen.

What is the IUPAC name of Methanol?

The PubChem-computed IUPAC name is methanol.

How do I make a model of Methanol?

Rotate the interactive model above to see how its 6 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

[Ethanol 3D model](#) C_2H_6O [Acetone 3D model](#) C_3H_6O [Water 3D model](#) H_2O [Methane 3D model](#) CH_4 [Ammonia 3D model](#) NH_3 [Carbon dioxide 3D model](#) CO_2 [3D molecular model viewer](#)Any molecule by name or SMILES[Build a molecule](#)Molecule builder kit[VSEPR geometry calculator](#)Shapes & bond angles[Molar mass calculator](#)Any formula

Oxygen Molecule Model - Interactive 3D Structure (O2)

<https://www.moldraw.com/molecules/oxygen.html>

Rotate a 3D ball-and-stick and space-filling model of oxygen (O₂, 31.999 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

The oxygen molecule, O₂, is two oxygen atoms joined by a double bond (bond order 2). Molecular orbital theory shows it has two unpaired electrons, which makes liquid oxygen magnetic.

Quick answer: Oxygen is **O₂**, molar mass **31.999 g/mol**. Linear diatomic around O=O. Nonpolar: both atoms are identical, so electrons are shared equally. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 977).

Oxygen at a glance

Formula	O ₂
Molar mass	31.999 g/mol
IUPAC name	molecular oxygen
Atoms / bonds	2 / 1
H-bond donors / acceptors	0 / 2
XLogP3	-1.1
SMILES	O=O
PubChem CID	977

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Oxygen shows

The model contains **2 atoms** (2 heavy atoms and 0 hydrogens) joined by **1 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 0 and accept 2 hydrogen bonds, and its PubChem XLogP3 of -1.1 means it is very water-loving (hydrophilic). Its topological polar surface area is 34.1 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
O=O	Linear diatomic	O=O bond length 121 pm, bond energy 498 kJ/mol

Is Oxygen polar?

Nonpolar: both atoms are identical, so electrons are shared equally.

Elemental composition of O₂

Element	Atoms	Mass (g/mol)	Mass %
Oxygen (O)	2	31.998	100.00%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of oxygen

- Respiration and medical oxygen
- Steelmaking (basic oxygen furnace)
- Oxy-acetylene welding and rocket oxidiser (liquid O₂)

Interesting facts

- O₂ is paramagnetic: liquid oxygen sticks between the poles of a strong magnet.
- A simple Lewis structure (O=O, all electrons paired) cannot explain this. MO theory puts two unpaired electrons in π^* orbitals.
- Oxygen makes up about 21% of dry air by volume.

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Frequently asked questions

Does O₂ have a double bond?

Yes, the bond order is 2. MO theory describes it as a σ bond plus two half- π contributions with two unpaired electrons.

Why is oxygen paramagnetic?

Its two highest-energy electrons occupy two different π^* orbitals with parallel spins (a triplet ground state).

What is the chemical formula and molar mass of oxygen?

Oxygen is O₂ with a molar mass of 31.999 g/mol (PubChem CID 977). It contains 2 atoms: 2 oxygen.

What is the IUPAC name of Oxygen?

The PubChem-computed IUPAC name is molecular oxygen.

How do I make a model of Oxygen?

Rotate the interactive model above to see how its 2 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red,

nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Water 3D modelH2O**Ammonia 3D model**NH3**Carbon dioxide 3D model**CO2**Ozone 3D model**O3**Hydrogen chloride 3D model**HCl**Methane 3D model**CH4**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Ozone Molecule Model - Interactive 3D Structure (O3)

<https://www.moldraw.com/molecules/ozone.html>

Rotate a 3D ball-and-stick and space-filling model of ozone (O3, 47.998 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Ozone is a bent triatomic form of oxygen with two equivalent O-O bonds. They are equal because of resonance between two Lewis structures. In the stratosphere it absorbs harmful UV light.

Quick answer: Ozone is **O₃**, molar mass **47.998 g/mol**. Bent (AX₂E), trigonal planar electron geometry, sp² around central O. Slightly polar (dipole about 0.53 D): the central O carries a partial positive charge and the shape is bent. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 24823).

Ozone at a glance

Formula	O ₃
Molar mass	47.998 g/mol
IUPAC name	ozone
Atoms / bonds	3 / 2
H-bond donors / acceptors	0 / 2
XLogP3	-1.7
SMILES	[O-][O+]=O
PubChem CID	24823

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Ozone shows

The model contains **3 atoms** (3 heavy atoms and 0 hydrogens) joined by **2 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 0 and accept 2 hydrogen bonds, and its PubChem XLogP3 of -1.7 means it is very water-loving (hydrophilic). Its topological polar surface area is 41.1 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
central O	Bent (AX ₂ E), trigonal planar electron geometry, sp ²	O-O-O 116.8°; both O-O 127.8 pm (between a single and a double bond)

Is Ozone polar?

Slightly polar (dipole about 0.53 D): the central O carries a partial positive charge and the shape is bent.

Elemental composition of O₃

Element	Atoms	Mass (g/mol)	Mass %
Oxygen (O)	3	47.997	100.00%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of ozone

- Water and air disinfection
- Bleaching and odour control
- Stratospheric ozone layer absorbs UV-B and UV-C

Interesting facts

- The two O-O bonds are identical, a classic example of resonance.
- Ground-level ozone is a pollutant formed when sunlight acts on NO_x and hydrocarbons.
- CFCs destroy stratospheric ozone through chlorine radical chain reactions.

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Frequently asked questions

What is the shape of ozone?

Bent, with an O-O-O angle of about 117°, because the central oxygen has two bonding domains and one lone pair.

Why are both bonds in ozone the same length?

Resonance: the double bond is spread over both O-O positions, so each has a bond order of 1.5.

What is the chemical formula and molar mass of ozone?

Ozone is O₃ with a molar mass of 47.998 g/mol (PubChem CID 24823). It contains 3 atoms: 3 oxygen.

What is the IUPAC name of Ozone?

The PubChem-computed IUPAC name is ozone.

How do I make a model of Ozone?

Rotate the interactive model above to see how its 3 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Water 3D modelH₂O**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**Oxygen 3D model**O₂**Hydrogen chloride 3D model**HCl**Methane 3D model**CH₄**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Propane Molecule Model - Interactive 3D Structure (C₃H₈)

<https://www.moldraw.com/molecules/propane.html>

Rotate a 3D ball-and-stick and space-filling model of propane (C₃H₈, 44.1 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Propane is a three-carbon alkane in which every carbon is tetrahedral (sp³). It is the familiar LPG fuel for barbecues and heating.

Quick answer: Propane is **C₃H₈**, molar mass **44.1 g/mol**. Tetrahedral, sp³ around C (×3). Essentially nonpolar (dipole about 0.08 D), which is why it does not mix with water. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 6334).

Propane at a glance

Formula	C ₃ H ₈
Molar mass	44.1 g/mol
IUPAC name	propane
Atoms / bonds	11 / 10
H-bond donors / acceptors	0 / 0
XLogP3	1.8
SMILES	CCC

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Propane shows

The model contains **11 atoms** (3 heavy atoms and 8 hydrogens) joined by **10 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It has no hydrogen-bond donors or acceptors, so it interacts mainly through weak London dispersion forces, and its PubChem XLogP3 of 1.8 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 0 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
C (×3)	Tetrahedral, sp ³	C-C-C ≈ 112°, H-C-H ≈ 107-109°

Is Propane polar?

Essentially nonpolar (dipole about 0.08 D), which is why it does not mix with water.

Elemental composition of C₃H₈

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	3	36.033	81.71%
Hydrogen (H)	8	8.064	18.29%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of propane

- LPG fuel for cooking, heating and vehicles
- Refrigerant (R-290)
- Feedstock for propylene

Interesting facts

- Propane boils at −42 °C, so it is stored as a liquid under modest pressure.
- Burning propane: $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$.
- Propane is odourless. Ethyl mercaptan is added so that leaks can be smelled.

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Frequently asked questions

What is the shape of propane?

Each carbon is tetrahedral, so the C-C-C chain is bent (about 112°), not straight.

Is propane polar?

No. C-H and C-C bonds are nearly non-polar and the molecule is roughly symmetric.

What is the chemical formula and molar mass of propane?

Propane is C₃H₈ with a molar mass of 44.1 g/mol (PubChem CID 6334). It contains 11 atoms: 3 carbon, 8 hydrogen.

What is the IUPAC name of Propane?

The PubChem-computed IUPAC name is propane.

How do I make a model of Propane?

Rotate the interactive model above to see how its 11 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Methane 3D modelCH4**Benzene 3D model**C6H6**Water 3D model**H2O**Ammonia 3D model**NH3**Carbon dioxide 3D model**CO2**Oxygen 3D model**O2**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Serotonin Molecule Model - Interactive 3D Structure (C₁₀H₁₂N₂O)

<https://www.moldraw.com/molecules/serotonin.html>

Rotate a 3D ball-and-stick and space-filling model of serotonin (C₁₀H₁₂N₂O, 176.21 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Serotonin (5-hydroxytryptamine, 5-HT) is a monoamine neurotransmitter. It has a flat indole ring with a 5-OH group and a flexible two-carbon chain ending in an amine.

Quick answer: Serotonin is **C₁₀H₁₂N₂O**, molar mass **176.21 g/mol**. Planar aromatic, sp² around indole ring. Polar. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 5202).

Serotonin at a glance

Formula	C ₁₀ H ₁₂ N ₂ O
----------------	--

Molar mass	176.21 g/mol
IUPAC name	3-(2-aminoethyl)-1H-indol-5-ol
Atoms / bonds	25 / 26
H-bond donors / acceptors	3 / 2
XLogP3	0.2
SMILES	<chem>C1=CC2=C(C=C10)C(=CN2)CCN</chem>
PubChem CID	5202

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Serotonin shows

The model contains **25 atoms** (13 heavy atoms and 12 hydrogens) joined by **26 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 3 and accept 2 hydrogen bonds, and its PubChem XLogP3 of 0.2 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 62 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
indole ring	Planar aromatic, sp²	≈ 120° (≈108° in the five-membered ring)
side-chain C and amine N	Tetrahedral / pyramidal, sp³	≈ 109.5°

Is Serotonin polar?

Polar. The amine (protonated at physiological pH) and phenol OH make it water-soluble.

Elemental composition of C₁₀H₁₂N₂O

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	10	120.110	68.16%
Hydrogen (H)	12	12.096	6.86%
Nitrogen (N)	2	28.014	15.90%
Oxygen (O)	1	15.999	9.08%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of serotonin

- Neurotransmitter regulating mood, sleep and appetite
- Gut motility signalling (about 90% of the body's serotonin is in the gut)
- Target of SSRI antidepressants

Interesting facts

- Serotonin is made from the amino acid tryptophan in two enzymatic steps.
- It is the precursor of melatonin.
- SSRIs block serotonin reuptake, raising its concentration in the synapse.

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Frequently asked questions

What is serotonin made from?

Tryptophan: it is hydroxylated to 5-hydroxytryptophan, then decarboxylated to serotonin.

What is the structure of serotonin?

An indole ring with an OH at position 5 and a CH₂CH₂NH₂ chain at position 3.

What is the chemical formula and molar mass of serotonin?

Serotonin is C₁₀H₁₂N₂O with a molar mass of 176.21 g/mol (PubChem CID 5202). It contains 25 atoms: 10 carbon, 12 hydrogen, 2 nitrogen, 1 oxygen.

What is the IUPAC name of Serotonin?

The PubChem-computed IUPAC name is 3-(2-aminoethyl)-1H-indol-5-ol.

How do I make a model of Serotonin?

Rotate the interactive model above to see how its 25 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Adrenaline (epinephrine) 3D modelC₉H₁₃NO₃**Melatonin 3D model**C₁₃H₁₆N₂O₂**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Sucrose Molecule Model - Interactive 3D Structure (C₁₂H₂₂O₁₁)

<https://www.moldraw.com/molecules/sucrose.html>

Rotate a 3D ball-and-stick and space-filling model of sucrose (C₁₂H₂₂O₁₁, 342.3 g/mol).
Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Sucrose, table sugar, is a disaccharide made of one glucose (a pyranose ring) and one fructose (a furanose ring). They are joined through both anomeric carbons by an $\alpha(1\rightarrow2)\beta$ glycosidic bond.

Quick answer: Sucrose is **C₁₂H₂₂O₁₁**, molar mass **342.3 g/mol**. Six-membered chair, sp³ carbons. Very polar: eight OH groups make it extremely soluble (about 2000 g/L at 25 °C). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 5988).

Sucrose at a glance

Formula	C ₁₂ H ₂₂ O ₁₁
Molar mass	342.3 g/mol
IUPAC name	(2R,3R,4S,5S,6R)-2-[(2S,3S,4S,5R)-3,4-dihydroxy-2,5-bis(hydroxymethyl)oxolan-2-yl]oxy-6-(hydroxymethyl)oxane-3,4,5-triol
Atoms / bonds	45 / 46
H-bond donors / acceptors	8 / 11
XLogP3	-3.7
SMILES	<chem>C([C@@H]1[C@H]([C@@H]([C@H]([C@H](O1)O[C@]2([C@H]([C@@H]([C@H](O2)CO)O)O)CO)O)O)O</chem>
PubChem CID	5988

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Sucrose shows

The model contains **45 atoms** (23 heavy atoms and 22 hydrogens) joined by **46 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 8 and accept 11 hydrogen bonds, and its PubChem XLogP3 of -3.7 means it is very water-loving (hydrophilic). Its topological polar surface area is 190 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
glucose ring	Six-membered chair, sp ³ carbons	≈ 109.5°
fructose ring	Five-membered furanose, envelope shape	≈ 105°
glycosidic O	Bent	C-O-C ≈ 115°

Is Sucrose polar?

Very polar: eight OH groups make it extremely soluble (about 2000 g/L at 25 °C).

Elemental composition of C₁₂H₂₂O₁₁

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	12	144.132	42.11%
Hydrogen (H)	22	22.176	6.48%
Oxygen (O)	11	175.989	51.41%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of sucrose

- Table sugar and sweetener
- Food preservation (jams) and fermentation feedstock
- Excipient in medicines

Interesting facts

- Sucrose is a non-reducing sugar because both anomeric carbons are tied up in the glycosidic bond.
- The enzyme invertase hydrolyses sucrose into glucose and fructose ("invert sugar").
- Sucrose is extracted mainly from sugarcane and sugar beet.

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Frequently asked questions

What two sugars make sucrose?

One α -D-glucose and one β -D-fructose, joined by an $\alpha(1\rightarrow2)\beta$ glycosidic bond.

Why is sucrose a non-reducing sugar?

Its glycosidic bond links the anomeric carbons of both sugars, so it has no free aldehyde or ketone group.

What is the chemical formula and molar mass of sucrose?

Sucrose is C₁₂H₂₂O₁₁ with a molar mass of 342.3 g/mol (PubChem CID 5988). It contains 45 atoms: 12 carbon, 22 hydrogen, 11 oxygen.

What is the IUPAC name of Sucrose?

The PubChem-computed IUPAC name is (2R,3R,4S,5S,6R)-2-[(2S,3S,4S,5R)-3,4-dihydroxy-2,5-bis(hydroxymethyl)oxolan-2-yl]oxy-6-(hydroxymethyl)oxane-3,4,5-triol.

How do I make a model of Sucrose?

With 45 atoms, Sucrose is a big kit build. Use the interactive model above as your guide, build the ring or core framework first, then add the side groups and finally the hydrogens.

More molecule models & tools

Glucose 3D modelC6H12O6**Fructose 3D model**C6H12O6**Water 3D model**H2O**Methane 3D model**CH4**Ammonia 3D model**NH3**Carbon dioxide 3D model**CO2**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Testosterone Molecule Model - Interactive 3D Structure (C₁₉H₂₈O₂)

<https://www.moldraw.com/molecules/testosterone.html>

Rotate a 3D ball-and-stick and space-filling model of testosterone (C₁₉H₂₈O₂, 288.4 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Testosterone is the main male sex hormone. Its steroid skeleton carries a 17 β -OH and an α,β -unsaturated ketone in ring A (C3=O conjugated with C4=C5).

Quick answer: Testosterone is **C₁₉H₂₈O₂**, molar mass **288.4 g/mol**. sp³ carbons, chair rings around rings B-D. Mostly non-polar (XLogP $\approx$ 3.3), with polar C=O and OH groups at the two ends of the molecule. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 6013).

Testosterone at a glance

Formula	C ₁₉ H ₂₈ O ₂
Molar mass	288.4 g/mol
IUPAC name	(8R,9S,10R,13S,14S,17S)-17-hydroxy-10,13-dimethyl-1,2,6,7,8,9,11,12,14,15,16,17-dodecahydrocyclopenta[a]phenanthren-3-one
Atoms / bonds	49 / 52
H-bond donors / acceptors	1 / 2
XLogP3	3.3
SMILES	<chem>C[C@]12CC[C@H]3[C@H]([C@@H]1CC[C@@H]2O)CCC4=CC(=O)CC[C@]34C</chem>
PubChem CID	6013

What the 3D model of Testosterone shows

The model contains **49 atoms** (21 heavy atoms and 28 hydrogens) joined by **52 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 2 hydrogen bonds, and its PubChem XLogP3 of 3.3 means it is fat-loving (lipophilic). Its topological polar surface area is 37.3 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
rings B-D	sp ³ carbons, chair rings	≈ 109.5°
ring A enone	sp ² C3, C4, C5; partly flattened ring	≈ 120°

Is Testosterone polar?

Mostly non-polar (XLogP ≈ 3.3), with polar C=O and OH groups at the two ends of the molecule.

Elemental composition of C₁₉H₂₈O₂

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	19	228.209	79.12%
Hydrogen (H)	28	28.224	9.79%
Oxygen (O)	2	31.998	11.09%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of testosterone

- Androgen hormone for male development and muscle mass
- Testosterone replacement therapy
- Precursor of estradiol (via aromatase) and of DHT

Interesting facts

- Testosterone is made from cholesterol, mainly in the testes.
- Aromatase converts testosterone into estradiol by aromatising ring A.
- 5α-Reductase converts it into the more potent dihydrotestosterone (DHT).

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Frequently asked questions

How is testosterone different from estradiol?

Testosterone has a C3 ketone and a C19 methyl group. In estradiol, ring A is aromatic with a phenol OH and has lost that methyl.

What is testosterone made from?

Cholesterol, via pregnenolone and androstenedione.

What is the chemical formula and molar mass of testosterone?

Testosterone is C₁₉H₂₈O₂ with a molar mass of 288.4 g/mol (PubChem CID 6013). It contains 49 atoms: 19 carbon, 28 hydrogen, 2 oxygen.

What is the IUPAC name of Testosterone?

The PubChem-computed IUPAC name is (8R,9S,10R,13S,14S,17S)-17-hydroxy-10,13-dimethyl-1,2,6,7,8,9,11,12,14,15,16,17-dodecahydrocyclopenta[a]phenanthren-3-one.

How do I make a model of Testosterone?

With 49 atoms, Testosterone is a big kit build. Use the interactive model above as your guide, build the ring or core framework first, then add the side groups and finally the hydrogens.

More molecule models & tools

Cholesterol 3D modelC₂₇H₄₆O**Estradiol (estrogen) 3D model**C₁₈H₂₄O₂**Water 3D model**H₂O**Methane 3D model**CH₄**Ammonia 3D model**NH₃**Carbon dioxide 3D model**CO₂**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Vanillin Molecule Model - Interactive 3D Structure (C₈H₈O₃)

<https://www.moldraw.com/molecules/vanillin.html>

Rotate a 3D ball-and-stick and space-filling model of vanillin (C₈H₈O₃, 152.15 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Vanillin is the main flavour molecule of vanilla. It is a benzene ring carrying an aldehyde (CHO), a methoxy (OCH₃) and a hydroxyl (OH) group: 4-hydroxy-3-methoxybenzaldehyde.

Quick answer: Vanillin is **C₈H₈O₃**, molar mass **152.15 g/mol**. Trigonal planar, sp². Polar and moderately water-soluble (about 10 g/L). Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 1183).

Vanillin at a glance

Formula	C ₈ H ₈ O ₃
Molar mass	152.15 g/mol
IUPAC name	4-hydroxy-3-methoxybenzaldehyde
Atoms / bonds	19 / 19
H-bond donors / acceptors	1 / 3
XLogP3	1.2
SMILES	<chem>COC1=C(C=CC(=C1)C=O)O</chem>
PubChem CID	1183

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Vanillin shows

The model contains **19 atoms** (11 heavy atoms and 8 hydrogens) joined by **19 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 3 hydrogen bonds, and its PubChem XLogP3 of 1.2 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 46.5 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring carbons	Trigonal planar, sp ² ; planar aromatic ring	120°
aldehyde C	Trigonal planar, sp ²	≈ 120°

Is Vanillin polar?

Polar and moderately water-soluble (about 10 g/L). The phenol OH can donate hydrogen bonds.

Elemental composition of C₈H₈O₃

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	8	96.088	63.15%
Hydrogen (H)	8	8.064	5.30%
Oxygen (O)	3	47.997	31.55%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of vanillin

- Most widely used flavouring (ice cream, chocolate, baking)
- Fragrances
- Intermediate for some drugs (e.g. L-DOPA syntheses)

Interesting facts

- Natural vanilla extract contains only about 1–2% vanillin by dry weight. Most vanillin is synthetic.
- Synthetic vanillin is made from guaiacol or lignin.
- Vanillin contains three functional groups: aldehyde, ether and phenol.

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Frequently asked questions

What functional groups are in vanillin?

An aldehyde ($-\text{CHO}$), an ether ($-\text{OCH}_3$) and a phenol ($-\text{OH}$) on a benzene ring.

Is vanillin planar?

Its benzene ring and attached aldehyde are essentially planar (all sp^2). Only the methyl hydrogens stick out.

What is the chemical formula and molar mass of vanillin?

Vanillin is $\text{C}_8\text{H}_8\text{O}_3$ with a molar mass of 152.15 g/mol (PubChem CID 1183). It contains 19 atoms: 8 carbon, 8 hydrogen, 3 oxygen.

What is the IUPAC name of Vanillin?

The PubChem-computed IUPAC name is 4-hydroxy-3-methoxybenzaldehyde.

How do I make a model of Vanillin?

Rotate the interactive model above to see how its 19 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

[Water 3D model](#) H_2O [Methane 3D model](#) CH_4 [Ammonia 3D model](#) NH_3 [Carbon dioxide 3D model](#) CO_2 [Oxygen 3D model](#) O_2 [Ozone 3D model](#) O_3 [3D molecular model viewer](#)Any molecule by name or SMILES[Build a molecule](#)Molecule builder kit[VSEPR geometry calculator](#)Shapes & bond angles[Molar mass calculator](#)Any formula

Vitamin C Molecule Model - Interactive 3D Structure (C₆H₈O₆)

<https://www.moldraw.com/molecules/vitamin-c.html>

Rotate a 3D ball-and-stick and space-filling model of vitamin c (C₆H₈O₆, 176.12 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Vitamin C (L-ascorbic acid) is built on a five-membered lactone ring with an enediol group (C=C carrying two OH). The enediol makes it acidic and a powerful antioxidant.

Quick answer: Vitamin C is **C₆H₈O₆**, molar mass **176.12 g/mol**. Trigonal planar, sp². Very polar and water-soluble, which is why vitamin C is not stored in body fat. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 54670067).

Vitamin C at a glance

Formula	C ₆ H ₈ O ₆
Molar mass	176.12 g/mol
IUPAC name	(2R)-2-[(1S)-1,2-dihydroxyethyl]-3,4-dihydroxy-2H-furan-5-one
Atoms / bonds	20 / 20
H-bond donors / acceptors	4 / 6
XLogP3	-1.6
SMILES	<chem>C([C@H]([C@H]1C(=C(C(=O)O1)O)O)O)O</chem>
PubChem CID	54670067

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Vitamin C shows

The model contains **20 atoms** (12 heavy atoms and 8 hydrogens) joined by **20 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 4 and accept 6 hydrogen bonds, and its PubChem XLogP3 of -1.6 means it is very water-loving (hydrophilic). Its topological polar surface area is 107 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
ring C=C carbons	Trigonal planar, sp ²	≈ 120°; ring nearly planar
side-chain C	Tetrahedral, sp ³	≈ 109.5°

Is Vitamin C polar?

Very polar and water-soluble, which is why vitamin C is not stored in body fat.

Elemental composition of C₆H₈O₆

Element	Atoms	Mass (g/mol)	Mass %
Carbon (C)	6	72.066	40.92%
Hydrogen (H)	8	8.064	4.58%
Oxygen (O)	6	95.994	54.50%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of vitamin c

- Essential nutrient; deficiency causes scurvy
- Antioxidant food additive (E300)
- Reducing agent in chemistry and photography developers

Interesting facts

- Its acidity ($pK_a \approx 4.1$) comes from an enol OH, not a carboxylic acid.
- Humans cannot make vitamin C because the gene for L-gulonolactone oxidase is non-functional.
- Vitamin C is needed to hydroxylate proline in collagen.

Drawing structures for your notes? MolDraw is a free online chemical structure editor for molecules, reactions and lab diagrams.

[Open MolDraw editor](#)

Frequently asked questions

Why is ascorbic acid an acid if it has no COOH group?

The OH on the enediol C=C is unusually acidic ($pK_a \approx 4.1$) because the resulting anion is resonance-stabilised.

What makes vitamin C an antioxidant?

The enediol readily gives up two electrons and two protons, becoming dehydroascorbic acid.

What is the chemical formula and molar mass of vitamin c?

Vitamin C is C₆H₈O₆ with a molar mass of 176.12 g/mol (PubChem CID 54670067). It contains 20 atoms: 6 carbon, 8 hydrogen, 6 oxygen.

What is the IUPAC name of Vitamin C?

The PubChem-computed IUPAC name is (2R)-2-[(1S)-1,2-dihydroxyethyl]-3,4-dihydroxy-2H-furan-5-one.

How do I make a model of Vitamin C?

Rotate the interactive model above to see how its 20 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Glycine 3D modelC2H5NO2**Glycerol 3D model**C3H8O3**Citric acid 3D model**C6H8O7**ATP (adenosine triphosphate) 3D model**C10H16N5O13P3**Water 3D model**H2O**Methane 3D model**CH4**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Water Molecule Model - Interactive 3D Structure (H2O)

<https://www.moldraw.com/molecules/water.html>

Rotate a 3D ball-and-stick and space-filling model of water (H₂O, 18.015 g/mol). Shape, bond angles, polarity, IUPAC name, 2D structure, uses and facts.

Water is the simplest bent molecule and the most important solvent on Earth. Its shape, two O-H bonds and two lone pairs on oxygen, explains its polarity, hydrogen bonding and unusually high boiling point.

Quick answer: Water is **H₂O**, molar mass **18.015 g/mol**. Bent (AX₂E₂), tetrahedral electron geometry, sp³ around O. Polar. Atom labels Hydrogens Spin

Drag to rotate · pinch or scroll to zoom. 3D coordinates: PubChem conformer (CID 962).

Water at a glance

Formula	H ₂ O
Molar mass	18.015 g/mol
IUPAC name	oxidane
Atoms / bonds	3 / 2
H-bond donors / acceptors	1 / 1
XLogP3	-0.5
SMILES	O
PubChem CID	962

2D structure (skeletal formula) · [Draw it in MolDraw](#)

What the 3D model of Water shows

The model contains **3 atoms** (1 heavy atom and 2 hydrogens) joined by **2 bonds**; in ball-and-stick mode every stick is one bond, and double or aromatic bonds are drawn as multiple sticks. Switch to *space-filling* to see the molecule as its electron cloud, scaled to van der Waals radii: this is the shape other molecules actually "feel". It can donate 1 and accept 1 hydrogen bonds, and its PubChem XLogP3 of -0.5 means it is fairly balanced between water and fat solubility. Its topological polar surface area is 1 Å².

Shape and bond angles

Atom(s)	Geometry / hybridisation	Angles & lengths
O	Bent (AX ₂ E ₂), tetrahedral electron geometry, sp ³	H-O-H 104.5°; O-H bond length 95.8 pm

Is Water polar?

Polar. The two O-H bond dipoles do not cancel in the bent shape, so the molecule has a dipole moment of about 1.85 D.

Elemental composition of H₂O

Element	Atoms	Mass (g/mol)	Mass %
Hydrogen (H)	2	2.016	11.19%
Oxygen (O)	1	15.999	88.81%

Calculated from IUPAC standard atomic weights. Check any formula with the [molar mass calculator](#).

Uses of water

- Universal solvent in chemistry and biology
- Reactant in hydrolysis and photosynthesis
- Coolant and heat-transfer fluid thanks to its high specific heat (4.18 J g⁻¹ K⁻¹)

Interesting facts

- Each water molecule can form up to four hydrogen bonds: two through its H atoms and two through its lone pairs.
- Ice is less dense than liquid water because hydrogen bonding locks molecules into an open hexagonal lattice.
- The 104.5° angle is smaller than the tetrahedral 109.5° because the two lone pairs push the bonds together.

Drawing structures for your notes? MolDraw is a free online chemical structure editor for molecules, reactions and lab diagrams.

[Open MolDraw editor](#)

Frequently asked questions

What shape is a water molecule?

Bent (V-shaped). Oxygen has two bonding pairs and two lone pairs arranged tetrahedrally, giving an H-O-H angle of 104.5°.

Why is water polar?

Oxygen is much more electronegative than hydrogen, and the bent shape means the two bond dipoles add up instead of cancelling.

What is the chemical formula and molar mass of water?

Water is H₂O with a molar mass of 18.015 g/mol (PubChem CID 962). It contains 3 atoms: 2 hydrogen, 1 oxygen.

What is the IUPAC name of Water?

The PubChem-computed IUPAC name is oxidane.

How do I make a model of Water?

Rotate the interactive model above to see how its 3 atoms connect, then copy it with a ball-and-stick kit: use the CPK colours shown (carbon grey or black, hydrogen white, oxygen red, nitrogen blue). For a school project, foam balls and toothpicks work well.

More molecule models & tools

Ammonia 3D model[NH₃](#)**Carbon dioxide 3D model**[CO₂](#)**Oxygen 3D model**[O₂](#)**Ozone 3D model**[O₃](#)**Hydrogen chloride 3D model**[HCl](#)**Methane 3D model**[CH₄](#)**3D molecular model viewer**Any molecule by name or SMILES**Build a molecule**Molecule builder kit**VSEPR geometry calculator**Shapes & bond angles**Molar mass calculator**Any formula

Organic Reaction Guides and Chemical Reaction Drawer

<https://www.moldraw.com/reaction/>

Organic reaction guides and chemical reaction drawer links for aldol condensation, Wittig, Grignard, Suzuki, Heck, Friedel-Crafts, and Diels-Alder reactions with MolDraw editor examples.

Aldol condensation

Carbonyl enolate addition followed by dehydration to form alpha,beta-unsaturated carbonyl compounds.

[Open guide](#)

Aldol Condensation Reaction Guide

<https://www.moldraw.com/reaction/aldol-condensation>

Aldol condensation guide with reaction scheme, two common examples, reaction SMILES, key conditions, and a button to edit the reaction in MolDraw.

Reaction Scheme

aldehyde or ketone + aldehyde or ketone -> alpha,beta-unsaturated carbonyl
Base or acid catalysis; heat often promotes dehydration.

Primary reaction SMILES: CC=O.CC=O>>C/C=C/C=O

Diels-Alder Reaction Guide

<https://www.moldraw.com/reaction/diels-alder-reaction>

Diels-Alder reaction guide with scheme, two common examples, reaction SMILES, conditions, and a button to edit the reaction in MolDraw.

Reaction Scheme

conjugated diene + dienophile -> cyclohexene derivative
Thermal reaction; electron-rich dienes and electron-poor dienophiles are common.

Primary reaction SMILES: C=CC=C.C=CC=O>>O=CC1C=CCCC1

Friedel-Crafts Acylation Guide

<https://www.moldraw.com/reaction/friedel-crafts-acylation>

Friedel-Crafts acylation guide with scheme, two common examples, reaction SMILES, conditions, and a button to edit the reaction in MolDraw.

Reaction Scheme

arene + acyl chloride -> aryl ketone
AlCl₃ or another Lewis acid generates the acylium electrophile.

Primary reaction SMILES: c1ccccc1.CC(=O)Cl>>CC(=O)c1ccccc1

Grignard Reaction Guide

<https://www.moldraw.com/reaction/grignard-reaction>

Grignard reaction guide with scheme, two common examples, reaction SMILES, conditions, and a button to edit the reaction in MolDraw.

Reaction Scheme

R-MgX + carbonyl -> alcohol after workup
Requires dry ether or THF; water and acids quench the reagent.

Primary reaction SMILES: C=O.C[Mg]Br>>CCO

Heck Reaction Guide

<https://www.moldraw.com/reaction/heck-reaction>

Heck reaction guide with scheme, two common examples, reaction SMILES, conditions, and a button to edit the reaction in MolDraw.

Reaction Scheme

aryl halide + alkene -> substituted alkene
Pd catalyst, base, heat; often gives E-alkene products.

Primary reaction SMILES: Brc1ccccc1.C=CC(=O)OC>>COC(=O)C=Cc1ccccc1

Suzuki Coupling Reaction Guide

<https://www.moldraw.com/reaction/suzuki-coupling>

Suzuki coupling guide with scheme, two common examples, reaction SMILES, conditions, and a button to edit the reaction in MolDraw.

Reaction Scheme

aryl halide + boronic acid -> biaryl
Pd catalyst, base, often aqueous organic solvent.

Primary reaction SMILES: B(O)(O)c1ccccc1.Brc1ccccc1>>c1ccc(-c2ccccc2)cc1

Wittig Reaction Guide

<https://www.moldraw.com/reaction/wittig-reaction>

Wittig reaction guide with scheme, two common examples, reaction SMILES, conditions, and a button to edit the reaction in MolDraw.

Reaction Scheme

aldehyde or ketone + phosphonium ylide -> alkene
Often run in ether, THF, or hydrocarbon solvents depending on ylide stability.

Primary reaction SMILES: O=Cc1ccccc1.C=P(c1ccccc1)(c1ccccc1)c1ccccc1>>C=Cc1ccccc1