Mindat Explorer — user guide

Mindat Explorer lets you browse the Mindat.org mineralogical database: mineral species, properties, chemistry, deposits and localities worldwide. Application created by Bruno Ducluzaux — version **1.7.0** (the number is shown next to the logo).

> **With or without a Mindat key.** With your personal Mindat key (free, chapter 1), the application queries the whole Mindat database. **Without a key, it works too**: 6,150 IMA species, 540 rocks, type localities on a map and photos (Wikidata lists shipped with the application, public domain), guided identification, comparison, My collection (import, labels, summary, backup). Only searches in Mindat (localities, full records, assemblages) need the key. On the welcome screen, click **"Use without a key"** (chapter 1, "Using the application without a key").

> The application is available in French and English: switch with the **FR / EN** button at the top right. Mineral and locality names come from Mindat and are in English.

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1. Getting started

Two ways to use Mindat Explorer

Mindat Explorer is used **from its web address**: **https://hydrogeologie.com/mindat-explorer/**. There are no files to download. Two ways to open it:

	A. In the browser	**B. As an installed application**
How to open it	type or click the address above in Chrome, Edge, Firefox or Safari	click the **Explorer** icon (desktop, Start menu, phone home screen)
Installation	none	once, from the browser (see below)
Appearance	a web page, with the browser's address bar	its own window, without an address bar, like a program
Without a network	no	yes, for kept localities (chapter 20)
Best for	trying it out, occasional use	regular use, and field trips with a phone

Either way it is **the same application**, always up to date: each new version arrives by itself. Mindat searches need **an Internet connection** and **your Mindat key**, which is free (see "First launch" below); without a key, much of the application works too ("Using the application without a key").

> **Tip (way A)**: add the address to your browser's **bookmarks** (the ☆ star at the end of the address bar)

> to find it easily.

> **Your data** (key, collection, favourites) stays on the device. On a computer and on Android, the site opened in the browser and the installed application share the same data. On **iPhone and iPad**, the home-screen application has its own data: enter the key again there, and restore a backup to find your collection.

Installing the application (way B)

> **Important**: installing is done **in the browser** (Chrome, Edge, Safari…), not in the application. The buttons to click are **the browser's own**: the icon at the end of the **address bar**, or the **browser menu** (⋮ or …), at the very top of the window on a computer, at the top or bottom of the screen on a phone. They are not buttons of the Mindat Explorer page itself.

Installing is free, takes a minute and **does not require a Mindat key**: the key can be entered later, in the installed application.

First step, for all browsers: in the browser, open **https://hydrogeologie.com/mindat-explorer/**, wait until the page is fully displayed, then **reload it once** (F5 key, or the circular arrow ⟳ left of the address bar). The browser then offers to install it.

Chrome on a computer (Windows, Mac)

1. In **Chrome's address bar**, at the far right, click the **Install** icon (a small screen with a down arrow).
2. If it does not appear: click **Chrome's menu** ⋮ (three vertical dots, top right of the window) → **Cast, save and share** → **Install page as app…** (depending on the version: ⋮ → **Install Mindat Explorer…**).
3. Click **Install** in the small window that opens. The application opens in its own window; its icon is added to the Start menu and the desktop.

Edge on a computer

1. In **Edge's address bar**, click the **App available** icon (three small squares and a "+").
2. If it does not appear: click **Edge's menu …** (three dots, top right of the window) → **Apps** → **Install this site as an app**.
3. Click **Install**. Edge then offers to pin the icon to the taskbar, Start menu or desktop: tick what suits you.

Firefox on a computer: it generally does not offer installation; use Chrome or Edge, or way A.

Chrome on Android

1. Tap **Chrome's menu** ⋮ (three dots, top right of the screen).
2. Tap **Install app** (or **Add to Home screen** → **Install**).
3. Confirm: the **Explorer** icon appears on the phone's home screen.

Edge on Android

1. Tap **Edge's menu** (≡ or …, at the bottom of the screen).
2. Tap **Add to phone** (or **Install app**), then confirm.

iPhone and iPad (Safari; Chrome and Edge from iOS 16.4)

1. Tap the browser's **Share** button (a square with an up arrow, at the bottom of the screen in Safari, in the address bar in Chrome).
2. Scroll and tap **Add to Home Screen**.
3. Tap **Add**, top right.

Afterwards: open Mindat Explorer by clicking (or tapping) the **Explorer** icon, like any program. You no longer need to go through the browser.

If something goes wrong

- **No install button**: check that the address starts with `https://`, then reload the page. If the application is already installed, the browser offers **Open in app** instead.
- **Uninstalling**: on a computer, in the application window, ⋮ or … menu top right → **Uninstall**; on a phone, long-press the icon → **Remove** (or **Uninstall**). Back up your collection first.

First launch: your Mindat key

To query Mindat, the application needs **your personal key, which is free**. On first launch, a welcome screen explains what to do:

1. **Create a free account** on mindat.org (log in / register link at the top of the page).
2. **Request API access**: a new account is at "level 0". On your Mindat home page ("My Home Page"), follow the instructions to request account activation. Mindat approves requests by hand: from a few hours to a few days. The welcome screen shows an **example of a filled-in form** (First name: Pierre, Surname: Martin, Member directory: No, and a description you can copy in one click).
3. **Copy your key**: once access is granted, an "Edit My Page" button appears on your Mindat page. Your "Mindat API key" (32 letters and digits) is at the very bottom of that page. Select it and copy it (Ctrl + C).
4. **Paste it** into the box on the welcome screen ("Paste" button or Ctrl + V), then click **"Check and save"**.

You only do this once: the key stays in your browser. Official guide: How to get my Mindat API key.

Using the application without a key

Mindat often takes time to issue API keys. Meanwhile, or for good, the **“Use without a key”** button on the welcome screen opens the application without a key. What works then:

- **Minerals**: the 6,150 IMA species of the Wikidata list (French name, formula, system, hardness, Strunz class, type locality, photo), with their reduced record (chapter 18);
- **Rocks**: 540 rocks, with photo and Wikipedia links (chapter 14);
- **Localities**: the type locality map (chapter 6);

- guided **Identification** of minerals (hardness, fizzing, crystal shape) and of **rocks** (63 rocks, chapter 16), and reduced **Compare**;
- **My collection**: records, table import, labels, summary, exports, **backup and restore** (handy on a new browser); favourites; Elements, Composition, Formula, Local database.

Searching Mindat (localities, full records, assemblages) needs the key. The Home page says so in a **"You are using the application without a Mindat key"** panel, with shortcuts to these pages, and a grey banner sits at the top of every page. To enter a key later: **"Enter my Mindat key"** in the banner, or **"I have a Mindat key"** in the Home page panel. The no-key mode stops as soon as a key is saved; the Wikidata lists then remain as a fallback when Mindat is not responding.

Seeing the Mindat examples (discovery mode)

On the welcome screen, **"Discover the Mindat examples"** opens a **discovery tour**: six pages pre-filled with real Mindat responses, reachable from the Home page:

Page	Example
Minerals	copper arsenates (Cu + As, no S)
Localities	the Cap Garonne mine (Var, France), with its full page
Assemblages	native gold + calaverite
Compare	pyrite, marcasite, chalcopyrite, galena
Favourites & history	a few sample pages
API explorer	a query about Cap Garonne

The linked pages (compared minerals, first arsenates, Cap Garonne) open too. Any other search shows a message asking for your key. An orange banner reminds you that you are in discovery mode. Two buttons leave it: **"Use without a key"** (switches to the no-key mode above) and **"Enter my Mindat key"** (back to the welcome screen). Your own favourites are not changed by this mode.

The small dot next to the 🔑 icon, at the top right, shows the connection status:

Colour	Meaning
green	Connected to Mindat
orange	Checking
orange	Mindat is not responding (usually the Mindat API, otherwise the connection)
red	Key rejected — click 🔑
grey	No key: Wikidata lists, personal data and offline tools

> **Patience**: the Mindat server takes 3 to 5 seconds to answer each query. The message "Querying Mindat…" is shown meanwhile. A page you have already viewed then appears instantly, even after closing the browser.

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2. The screen

- **On the left**, the menu: Home, Minerals, Localities, Rocks, Elements, Identification, Compare, Assemblages, Resources, My collection, Favourites & history, Offline, API explorer, and in expert mode Composition (EDS), Formula, Analysis tools, Local database. On a phone, open it with the ☰ button.
- **At the top**, the **Search for a mineral** bar (blue border, on every page), the 🔑 button (settings), the moon / sun button (dark or light theme) and the FR / EN language button.
- **At the bottom of the menu**, **User guide (PDF)** opens this guide, in French or English depending on the application language. The link is also on the welcome screen and in the 🔑 settings.
- The browser's **Back** button works as usual.

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3. Quick search

Click the search bar, or press `Ctrl` + `K` (or `/`).

Type the beginning of a name:

- a mineral: `azur`, `chalcop`, `quartz`… Names are **in English** in Mindat (*Galena*, *Baryte*, *Native Gold*). Synonyms and foreign names are recognised: `Azurit` opens the azurite page; the mineral with **exactly** the typed name comes first (`illite`, `pyrite`, `galène`), with or without accents;
- a locality: `Chessy`, `Tsumeb`, `Sainte-Marie`…

Use the ↑ ↓ arrows then **Enter**, or click a result. With nothing typed, the window offers your most recently viewed pages.

Without a Mindat key, or when Mindat is not responding, the search uses the lists shipped with the application (chapter 18): species (English or French name: `pyrite`, `galène`), rocks (`granite`) and type localities (`Chessy`, `Tsumeb`). A type locality opens the Localities page, **Type localities** panel, filtered on that place. Other localities need the key.

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4. Searching for minerals

Minerals menu. Results update automatically at each change.

Ready-made ideas

The "Ideas" row at the top offers typical searches: copper arsenates, uranium minerals, hard gems, most widespread minerals, new IMA species…

Two ideas rely on properties that are easy to check on a specimen:

Idea	Criteria	First results
Soft, perfect cleavage	hardness ≤ 3 (scratched by a copper coin), perfect cleavage, ≥ 100 localities	calcite, galena, muscovite, baryte, gypsum…
Metallic and heavy	metallic lustre, density ≥ 7 (heavy in the hand), ≥ 100 localities	native gold, galena, native copper, acanthite…

The **A single mineral** row offers combinations of simple properties that leave only one species among the most common ones (≥ 1,000 localities); hover over a name to see its criteria:

Example	Criteria
Galena	cubic, metallic, perfect cleavage, density ≥ 6
Pyrite	cubic, metallic, yellow, hardness ≥ 5
Fluorite	cubic, transparent, vitreous, perfect cleavage, hardness ≥ 3.5
Halite	cubic, transparent, vitreous, perfect cleavage, hardness ≤ 2.5
Calcite	trigonal, transparent, vitreous, perfect cleavage, hardness ≤ 3
Quartz	trigonal, transparent, hardness 7 to 7.5
Gypsum	monoclinic, transparent, perfect cleavage, hardness ≤ 2, density ≤ 2.5
Baryte	orthorhombic, transparent, perfect cleavage, density ≥ 4.2
Topaz	orthorhombic, transparent, hardness ≥ 8

Chemistry: the periodic table

Click an element:

Clicks	Effect
1 click	**blue** ✓: the mineral must contain this element
2 clicks	**red** ∅: the mineral must not contain it
3 clicks	back to neutral
right-click	exclude directly

Elements found in no mineral (noble gases, Tc, Pm, Po, At, Fr, Ac, Pa and from neptunium on) are greyed out and do not respond; the **Elements without minerals clickable** box, below the table, makes them clickable.

Example: Cu and As in blue, S in red = copper and arsenic minerals without sulfur.

Exclude all other elements (at the top, next to “Chemistry”): every element not ticked in blue turns red and "Essential elements only (tolerates substitutions)" is switched on. This gives an exclusive search, as on mindat.org: the mineral's **essential** elements are exactly those ticked in blue; a minor substitution is tolerated. Example: S + Hg + Ag then this button = imiterite, UM1985-19-S:AgHg (Ag_4HgS_2) and UM2004-33-S:AgCuHgSe ($(Ag,Cu)_8Hg_3(S,Se)_7$, where Cu and Se are not essential). Switch this option off to strictly exclude any other element present, even as a substitution (UM2004-33 then disappears). A second click ("Undo excluding the others") removes all exclusions.

On a phone, the table opens on its right-hand part (C, N, O, S, halogens, noble gases); swipe it to the right to reach H, Li, Na, K…

Below the table:

- **Essential elements only (tolerates substitutions)**: only the essential elements of the formula are taken into account: an element ticked in blue must be essential, not just an impurity. With "Exclude all other elements", the other elements are only rejected when they are essential (a minor substitution is tolerated); switched off, every element present counts and the search is stricter;
- **Species**: which kind of entries to show.

Choice	Results
Auto	IMA-approved species, then unnamed species at the end of the list
IMA	IMA-approved species only
Unnamed (UM)	only species described but not yet named ("UM…", "Unnamed (…)"), sorted by name
All entries (default)	everything, including varieties, synonyms (`galène`), series (`illite`), rocks…

The **ideas** and **A single mineral** switch to **Auto**: they were checked on IMA species.

Unnamed species are labelled "Unnamed" under their name. They are recognised by their name or their IMA note (the note is missing from most Mindat records).

The **name search**, large at the top of the page, accepts the beginning of a name (`bario` finds Bariopharmacosiderite…) and the wildcards `*` (several letters) and `_` (one letter): `qu_rtz`. When the full name is typed, with no other criterion, the record with **exactly** that name comes first, whatever the sort: `pyrite`, `illite`, or `galène` (the synonym brings the species Galena, placed just before it). Below the ideas, the **Chemistry** panel (periodic table and its settings) then the **Properties** panel use the full width.

Properties

In the "Properties" panel, criteria are ordered from the easiest to the hardest to observe on a specimen:

- **Diaphaneity**: transparent, translucent, opaque;
- **Colour** and **streak** (in English: `green`, `red` …);
- **Lustre** and **cleavage**;
- **Density**: drag the two handles, from 0 to 10; "10+" at the top means no upper limit. A density given as a range (native gold: 15 – 19.3) is kept if it overlaps the requested range; species with no known density are left out;
- **Mohs hardness**: same principle;
- **Crystal system**: click one or more systems;
- **Frequency**: leaves out the rarest species by keeping only those reported from at least 10, 50, 100 or 1,000 localities (about 2,400, 1,000, 680 and 140 IMA species). Results are then listed from the most widespread to the rarest (or by name if that sort is chosen);
- **Other tests**: tenacity, fracture;
- **Optical**: optical character (isotropic, uniaxial, biaxial), sign, refractive index;
- **Entry type & IMA status**: varieties, rocks, discredited minerals…

The number badge shows how many filters are active; **Clear all** resets them.

Results

- Click a row to open the mineral page, or an element in the Elements column to open its page (Elements page).
- Click a column header (Name, Hardness…) to sort the displayed page.
- The sort menu changes the order: most widespread, rarest, most photographed, name, recent approval…
- ⭐ adds to favourites, ⇄ adds to the comparison.
- **Previous / Next** to change page (the number of results per page is set in the 🔑 settings).
- **Export**: the displayed page or all results (up to 2,000), as **CSV** (opens directly in Excel) or JSON.

Your criteria are kept when you open a page and come back.

To spare your Mindat quota (about 1,000 requests per hour), lists loaded in full (unnamed species, exclusive search, exports) stop at 2,000 entries per source. An orange banner says so: narrow the search in that case.

When Mindat is not responding: the local database

If Mindat does not respond (overloaded server, 504 error…), the search is abandoned after 30 seconds and the page switches by itself to the **local database** (chapter 18): an orange banner "Mindat is not responding: searching the local database" says so, with the date of the copy. The **Local database** switch above the results also lets you choose it at any time; **Retry Mindat** (or **Back to Mindat**) returns to the normal search.

- Available: name, elements (included, excluded, essential, exclusive search), crystal system, hardness, density, frequency, lustre, diaphaneity, cleavage, tenacity, fracture, colour, streak; sort by name or frequency; export.
- Not available (listed in the banner, then ignored): optics and refractive index, entry type, IMA status, unnamed species, varieties and synonyms (the database holds IMA species only), other sort orders.
- The Mindat local database is downloaded on a day when Mindat responds: **Local database** page in expert mode, or simply a visit to the Elements page. Until then (and **without a key**), the **Wikidata list** shipped with the application replaces it (chapter 18): search by name, French name (“galène”), elements, crystal system and hardness.
- Clicking a mineral shows a **reduced record** (formula, elements, properties), taken from the offline copy or the local database.

Matching groups

As soon as at least one element is ticked in blue, a **Matching groups** panel appears below the results: the groups, subgroups and supergroups (Garnet Supergroup → Garnet Group, Amphibole Supergroup → Calcium Amphibole Subgroup…) that at least one species found belongs to, with the number of matching species.

- Click a group name to open its page.
- Click the › arrow to expand **all** its members: those matching the search are ticked ✓ and listed first.

Why not filter groups directly? In Mindat, a group only carries the fixed elements of its generic formula (Garnet Group: Si and O only). Groups are therefore found from their members. For a very broad search, the calculation covers the first 1,000 results (the panel says so).

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5. The mineral page

At the top: the name, the formula (the 📋 button copies it), the status badges and the key figures (hardness, density, system, lustre, number of localities and of photos on Mindat).

The buttons: **Add to favourites**, **Compare**, **mindat.org** (opens the original page). The **Mindat photos** box can be clicked: it opens the mineral's photo gallery on mindat.org.

Wikimedia Commons photo. When Wikidata knows one (about 3,800 species), a photo of the mineral is shown on the right of the Overview, with or without a key (reduced record included). These photos are not in the public domain: each shows its **author** and **licence** (often CC BY-SA), and a click opens its page on Wikimedia Commons (full licence, large size). To reuse them, follow that licence. They need the network; photos already seen stay visible offline (the last 400).

The tabs:

Tab	Content
Overview	description, name origin, occurrence, uses, composition, type locality(ies) on a map, discovery and approval dates
Members	for a group only: its species and subgroups, expandable
Properties	colour, streak, lustre, diaphaneity, fluorescence, hardness, tenacity, cleavage, fracture, density, habit, twinning
Crystallography & optics	class, space group, cell, refractive indices, birefringence, 2V, pleochroism, Strunz and Dana classifications
Localities	map and list of all known localities, 100 at a time
Relations	varieties, polymorphs, associated and related minerals…

In **Localities**:

- type the beginning of a place (`France`, `France, Brittany`) or click a country to filter;
- **Type localities only** keeps only the places where the mineral was discovered (👑);
- **Load 100 more** to go further;
- orange dots on the map are type localities.

In texts, underlined mineral names link to their page.

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6. Searching for localities

Localities menu. The **Locality search (Mindat)** panel, below the “Localities around me” and “Type localities” panels, needs the key. Fill in at least one criterion:

- **Name contains**: `Malines`, `Chessy`… (often in the local language or in English);
- **Country**: drop-down list (English names: *France*, *Germany*, *Switzerland*…);
- **Level**: administrative divisions (regions, departments, municipalities) or sites (mines, quarries);
- **Description contains**: `pegmatite`, `skarn`… (in English);
- **Chemical filter**: the periodic table, to find for instance all French localities where a tellurium mineral has been reported (Te in blue).

Localities around me (or a point): the panel at the top of the page opens with a click. Tap **My position**: in mainland France, the department you are in is chosen automatically and its sites are shown on a map and in a list, nearest first (optional radius of 5 to 100 km; nearby departments offered). Elsewhere, or for another point, choose the area (department, municipality, region…). Clicking a site opens its page. The same tool exists in My collection, "What I'm missing" tab.

> List for documentation only, which does not invite anyone to visit these sites: many are private, protected or off limits, and old mines are dangerous. Any visit requires the owners' permission and compliance with local regulations.

Type localities (Wikidata, no key): this panel, open by default without a Mindat key, shows on a map and in a list the **discovery sites** of species according to the Wikidata list shipped with the application (chapter 18): about 1,300 places for 4,200 species, 1,050 of them on the map. It works without a key and offline (except the map background). Type a place (`Tsumeb`), a country (`France`) or a mineral (`cuprite`) to filter; places with the most species come first. Clicking a point shows the place, its country and its species (links to their record). The place name opens the Mindat page when Wikidata gives its number (rare); otherwise a **Wikidata** link is offered. The list is not complete: Wikidata knows the type locality of only some species (only 25 places in France). If “Wikidata list unavailable” is shown, the cause is given in brackets: check the connection and click **Try again**; “file://” means the application was opened as a file, not by its https address.

List / Map switches between the table and the map of results. The 🗺 icon in the GPS column marks a geolocated locality. **Export CSV** produces the list with coordinates (up to 2,000 localities).

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7. The locality page

At the top: the clickable hierarchy (France › Region › Department › Municipality › Mine), the type of place, the coordinates (📋 to copy them) and links to mindat.org, the place's **Photos** gallery on mindat.org, Google Maps and Wikipedia.

The four figures: number of species and varieties, of IMA species, of minerals for which this is the type locality, and of sub-localities.

Tab	Content
Species	all species of the place **and its sub-localities**
Chemistry	the site's "chemical signature"
Map	the place and its sub-localities
Sub-localities	the places directly below (mines in a municipality…)
Detailed occurrences	habit, colour, quality, rarity and bibliographic references
Description	the Mindat presentation text

In **Species**, the filter field accepts a name (`pyr`) **or** element symbols (`Cu As` = species containing copper and arsenic). 👑 marks a type locality, "questionable" a disputed presence. The **CSV** button exports the list.

In **Chemistry**, each box of the periodic table shows how many species of the site contain the element: the darker the box, the more present the element. Click an element to see these species.

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8. Assemblages

Assemblages menu — to answer "where are these minerals found together?".

1. **Add a mineral** under "Must be present" (at least one, up to 8).
2. Optional: **Exclude a mineral** under "Must be absent".
3. Click **Find localities**.

Example: azurite + malachite, without cuprite. Examples are offered to the right of the buttons.

The result gives the total number of localities, a map, the breakdown by country (click a country to filter) and the list. Localities load 200 at a time: **Load … more** for the rest. **CSV** exports the displayed list.

From a mineral page, the **Relations** tab offers a direct link to this page.

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9. Compare

Add up to **4 minerals** with the ⇄ **Compare** button (on pages or result lists), or directly from the **Compare** page with **+ Add**.

After the formula and the elements, properties are ordered from the easiest to the hardest to obtain on a specimen:

1. **visual observation**: colour, diaphaneity, lustre, crystal system;
2. **simple tests**: density, hardness, streak, cleavage, fracture, tenacity, UV fluorescence;
3. **optics & crystallography**: optical character, refractive index, birefringence, pleochroism, cell, calculated density;
4. **status & classification**: IMA status, discovery, number of localities, then Nickel-Strunz and Dana last.

Rows where values differ are slightly coloured; **Differences only** hides the others. Ideal to tell calcite from aragonite, pyrite from marcasite, etc.

CSV exports the table, **Clear** resets the comparison.

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10. Favourites and history

- The ⭐ star on a page or a row adds it to your favourites; click again to remove it.
- The **Favourites & history** page groups them, with the last 40 pages viewed.
- Favourites are part of the **full backup**: **Back up everything** panel at the top of the page (see My collection, "Backing up: essential"). This is how to get them on another computer.

The Home page also shows your latest pages in the "Pick up" panel.

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11. Home

- **Mindat Explorer highlights**, at the top: Identification, Compare, **Localities around me** (opens the Localities page on that panel) and Assemblages.
- **Twelve tiles** lead to the main pages, in menu order: Minerals, Localities, Rocks, Elements, Identification, Compare, Assemblages, **Resources**, **My collection**, **Favourites & history**, **Offline** and **API explorer**.
- The **Expert mode** panel opens Composition (EDS), Formula, Analysis tools and Local database (chapter 18).
- **Mineral of the day**: the same for everyone each day; every other day it is a common species (known from more than 1,000 localities). **Another** draws one at random. **Without a key** (or when Mindat is not responding), it is taken from the Wikidata list (chapter 18): name, French name, formula, system, Strunz class, name origin and type locality; every other day among the 300 most cited species. **View page** opens the reduced record. The mineral's **photo** (Wikimedia Commons, with its author and licence) is shown alongside, with or without a key.
- **Most widespread** and **Latest approved species** by the IMA.

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12. Settings (🔑 icon)

Setting	Use
Mindat API key	your personal key. The link "How do I get my Mindat key?" recalls the steps. Clearing the key and saving takes you back to the welcome screen.
Test connection	checks that the key works
API URL	do not change
Theme	system, light or dark
Results per page	25, 50, 100 or 200
Backup	back up everything to a file, or restore (see My collection)
Clear cache	forces the data to be reloaded from Mindat
Clear favourites, history and comparison	reset

Remember to click **Save**.

At the bottom of the window: **About** (version, credits, link to this guide) and the **Legal notice** (click to expand).

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13. The API explorer (for the curious)

To query any Mindat service directly: choose an endpoint (`geomaterials`, `localities`, `occurrences`…), add parameters (possible parameters are listed below, hover over them for their description), then **Send**. The response is shown as a table, a tree or raw text, and can be exported as JSON. **URL** and **curl** copy the query for use elsewhere.

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14. Rocks

Rocks menu (at the bottom). Rocks have their own page because they are searched differently from minerals: Mindat gives them no formula or physical properties, but a **classification** (Rock › Igneous rock › … › Granitoid › Granite). Rocks also remain visible in the mineral search ("All entries", entry type "Rock").

The full list (over 3,300 rocks) is downloaded once, kept in the browser and updated every month: searching is then instant.

Without a key (or when Mindat is not responding), the page shows instead the **Wikidata rock list** shipped with the application (about 550 rocks, public domain): search by **French or English** name (`limestone`, `gneiss`), filter by family (igneous, metamorphic, sedimentary, meteorites, other), thumbnail photo. A click opens a **reduced record**: French and English names, family, description, Wikimedia Commons photo (author and licence), **Wikipedia** (French and English), **Wikidata** and **mindat.org** links. A

rock's detailed classification, minerals and localities need Mindat. These rocks are also offered for the **Rock** field of specimens (chapter 17). The **Identify a rock** link, at the top of the Rocks page, opens rock identification (chapter 16), with or without a key.

With a key, the page of a Mindat rock also shows a **Photo and links (Wikidata)** panel when the rock is in the Wikidata list (by its Mindat number, otherwise by its name): Wikimedia Commons photo with its author and licence, short description, Wikipedia and Wikidata links. **When Mindat is not responding**, the reduced Wikidata record is shown instead (photo included), with **Retry Mindat**. A rock missing from the Wikidata list is then shown from the Mindat rock list already kept in the browser: name, French name, classification, mindat.org link.

Searching

- **Name**: Mindat rock names are **in English** (*Limestone*, *Sandstone*…). About 80 common French names are also recognised (`calcaire` , `grès` , `schiste` …); the translation found is shown below the field. The search matches any part of the name (`granit` finds Granite, Biotite granite, Monzogranite…).
- **Family**: igneous, metamorphic, sedimentary, meteorites, superficial deposits, other (ores, artificial materials…), with the number of rocks.
- **Frequency**: keep only rocks reported from at least 10, 100 or 1,000 localities (about 580, 190 and 40 rocks).
- **Classification** (right-hand panel): the family tree. The › arrow expands a group; clicking a name limits the search to that group and all its sub-types ("Within: Granitoid ✕").
- **Ideas**: most widespread rocks, common igneous / metamorphic / sedimentary rocks, granites and related, plutonic, volcanic.

Results

For each rock: name (and French name when known), place in the classification (click a level to filter on it), number of localities and of photos on Mindat (the photo count opens the gallery). Sort: most widespread, most photographed or by name. **CSV** exports the list, with the full classification.

The rock page

- at the top, the clickable classification path, the family, the number of localities, photos (link to the Mindat gallery), essential minerals and sub-types;
- **Overview**: the Mindat description, the **essential minerals** that make up the rock and the **common ore minerals** when Mindat lists them (links to their pages), and the **sub-types**, most widespread first;
- **Localities**: map and list of the places where the rock is reported, 100 at a time, with a country filter.

From the "mineral" page of a rock, the **Rock page** button opens this page.

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15. Elements

Elements menu (at the bottom): one page per chemical element.

Overview: the periodic table coloured by the number of IMA mineral species containing each element (the darker the box, the more species), then the ranking of elements (number of species, as an essential element, share of species). Click an element or a row to open its page. 73 of the 118 elements occur in at least one species; the others (noble gases, synthetic elements…) still have a page.

The element page:

- **General data**, built into the application: atomic number, atomic mass, group, period, block, family, state at 20 °C, discovery date, abundance in the Earth's crust, radioactivity (indicative values: IUPAC atomic weights, CRC Handbook abundances);
- **In minerals**: number of species containing the element, as an essential element, share of all species and the element's rank; species made of this element alone (native gold, graphite and diamond for carbon…); the **Search minerals containing…** button opens the mineral search pre-filled;
- **Associated elements**: the elements most often found in the same species, as bars (number of species and percentage). O and H, present almost everywhere (oxides, hydroxides, water), are hidden by default. Click a bar to see the minerals containing both elements;
- **Main minerals**: species in which the element is essential, most widespread (number of localities) first.

The arrows at the top right go to the previous or next element.

Statistics come from Mindat: the list of all IMA species and their elements is loaded once (7 requests) and kept for a month; the date is shown and **Refresh** reloads it.

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16. Guided identification

Identification menu: identify a specimen by answering simple questions, in any order. **I don't know** is always allowed. If unsure, tick **several answers** (transparent and translucent, two neighbouring hardnesses, heavy and very heavy…): a species is kept if it matches one of them. Two-answer questions (metallic or not, fizzing…) accept only one.

Question	How to observe it
Appearance	metallic (like polished metal) or not
Light	transparent, translucent or opaque, against the light
Colour	main colour on a fresh break
Hardness	scratched by a fingernail (≤ 2.5), a copper coin (≤ 3.5), a knife (≤ 5.5), or scratches glass
Flat planes	good to perfect cleavage, or irregular break
Heft	light, ordinary (like a quartz pebble), heavy, very heavy
Streak	colour of the powder on unglazed porcelain
Acid	fizzing with vinegar or dilute hydrochloric acid (carbonates)
Crystal shape	cubes, six-sided prisms, square prisms, other

On the right, the **possible species** update with each answer: first those whose Mindat data confirm all your answers, then the most widespread. You choose to search among very common species (≥ 1,000 localities), common (≥ 100, by default), ≥ 10 localities or all. Mindat data are sometimes incomplete: a species with a missing value is not ruled out; if most of its data are missing, it is listed separately. **Start again** clears the answers. A reliable identification often needs an analysis (EDS, XRD).

Example: non-metallic, transparent, violet, scratched by a knife but not by copper, flat planes, ordinary heft, no fizzing, cubes → fluorite.

The page uses the IMA species database downloaded once a month (chapter 18). Each possible species comes with a **thumbnail** (Wikimedia Commons photo, if Wikidata has one).

Without the Mindat database (no key, or Mindat unavailable before the first download), the page uses a **key of 100 common minerals** (quartz, calcite, pyrite, galena, fluorite, malachite…) that has all the properties: every question stays active, and species are ranked from most to least widespread. A rarer mineral is not in it: the **All IMA species** choice switches back to the full Wikidata list (6,150 species), with only the hardness, fizzing and crystal shape questions.

Identifying a rock

At the top of the page, the **A rock** button (next to **A mineral**) opens rock identification. It works **without a Mindat key and offline**. The **Identify a rock** link on the Rocks page leads there too. Six questions, on a fresh break:

Question	Answers
Grain	coarse (visible grains, ≥ 1 mm), fine, large crystals in a fine groundmass, glassy, cemented pebbles or grains
Structure	massive, bedded, foliated, banded, vesicular
Shade	light, medium, dark
Acid (10% HCl, cold)	strong, weak or only on the powder, none
Scratches glass	yes, no
Minerals recognised	30 minerals (quartz, feldspars, micas, amphibole, pyroxene, olivine, garnet, calcite…)

If unsure, tick several answers, or leave **I don't know**. Hovering over a mineral name tells how to recognise it (also in **How to recognise them**). Only tick minerals you are sure of: a mineral impossible in a rock **rules it out** (quartz rules out basalt and gabbro, olivine rules out granite). Ruled-out rocks are listed separately.

Before any answer, the list shows the 63 rocks, most common and best known first (granite, limestone, mica schist, shale, slate, coal, sandstone…). Likely rocks are then ranked by fewest non-matching answers, then most matching answers; on a tie, the most common rock first. For each: family, field clues, essential minerals, answers that do not match, rocks not to be confused with, and a thumbnail. A click opens the rock's page (photo, Wikipedia links; Mindat page with a key).

The key covers **63 common rocks** (igneous, metamorphic, sedimentary), written for the application and validated by the author. A reliable identification often needs a thin section or an analysis.

Example: coarse, massive, light, no fizzing, scratches glass, quartz + K-feldspar + biotite → granite (then granodiorite).

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17. My collection

My collection menu: the inventory of your specimens, in four tabs: **Specimens**, **Wish list**, **Duplicates for trade** and **What I'm missing**.

Adding a specimen

New specimen, or **Add to my collection** on a mineral page (species pre-filled) or a locality page (locality pre-filled). The record holds:

- **species**: searched in Mindat; the first is the main species (e.g. galena + fluorite). Optional: a specimen **not yet identified** can be saved without a species; it shows as "Not identified" in the list and on labels;
- **locality**: type it, then pick a Mindat record from the list to link it, or keep your own text;
- **specimen type**: micromount, thumbnail (≤ 2.5 cm), miniature (2.5–5 cm), small cabinet (5–8 cm), cabinet (8–12 cm), museum (> 12 cm), or a study preparation: raw sample, polished section, thin section, SEM stub (indicative sizes);
- **sampling point**: the exact spot within the locality ("upper dump", "adit 2", "ARP03");
- **rock** (host rock, matrix): free text; while typing, rocks from the Wikidata list are suggested (French and English names) and, if the name is recognised, a **Rock record** link opens its record (photo, Wikipedia links). Also in bulk edit, search, sorting, the CSV and Excel exports, and Darwin Core (`hostRock` in `dynamicProperties`);
- **collection date**: a year (`1985`), a month (`2024-07`), a date (`2024-07-14`) or a range of years (`1777-1800`); any other form ("circa 1900") is kept as is, flagged in orange;
- **collector**: the person who collected it (names already entered are suggested). Collection is independent of acquisition: a purchased specimen also has a collector and a collection date;
- **inventory no.** (suggested automatically: 0001, 0002…), dimensions, weight, storage (drawer, box…);
- **acquisition**: purchase, exchange, gift, self-collected or other, acquisition date, source (dealer, show, trader…);
- **duplicate offered for trade**; notes.

The pencil ✎ on a row reopens the record (edit, delete).

Importing a table of samples

Import a table (.xlsx, .csv) adds the samples of an Excel workbook or a CSV file in one go: one row per sample, with its number and its minerals separated by commas ("Malachite, Quartz, Bornite (?)").

1. **Choose the file**, then the **sheet** (list sheets such as "_lists" are skipped).
2. Check the **Sample number** and **Minerals** columns, recognised from their title ("Sample ID", "Minerals / phases identified"…). Without a number column, the next collection numbers are used. The **Specimen type** ("Type", "Preparation"…), **Sampling point** ("Location ID"…), **Collection date** and **Collector** columns are recognised in the same way, if the file has them.
3. **Columns copied into the notes**: the other columns (click to remove them), as "Title: value".

4. **Values shared by the whole batch**, to fill in before importing: **locality**, **acquisition mode** (self-collected, purchase…), **specimen type** (for example the whole batch as micromounts), **sampling point**, **collection date**, **collector**. Handy for a batch from the same locality, collector or field trip. A file column, chosen and filled in, takes precedence over the shared value.
5. **Mineral names**: each name is matched with a Mindat record, first in the local database, then in Mindat (series, mixtures such as "Wad", synonyms). An unrecognised name ⚠ is fixed with **Choose the record**; otherwise it is only copied into the notes ("Not found in Mindat: …"). **Without a key** (or with Mindat unavailable), the search uses the local list, which has neither mixtures ("Wad") nor some species ("Cuproasbolane"): in **Choose the record**, click **Search mindat.org ↗** (the site opens with the name), open the right record, copy its address (`https://www.mindat.org/min-…html`) and paste it into the field at the bottom, then **OK**. The file's name is kept, linked to that Mindat record. The same field is available wherever a species is added (specimen record, bulk edit).
6. **Details** ("Bornite (?)", "Malachite (Zn-bearing)", "Aurichalcite (or Zincrosasite ?)") give the species and are copied into the notes; chemical suffixes ("Monazite-(Ce)") are part of the name.
7. **Preview**, then **Import**. A number already in the collection is skipped (a switch imports it anyway).

Remember to **back up** the collection after an import.

The list

Counters (specimens, species, localities, duplicates for trade), search across all fields (`fluorite show`), checkboxes to act on a selection.

- **Sorting**: **Sort** menu (no., main species, locality, sampling point, type, collection date, collector, acquisition mode and date, dimensions, storage, date added or modified) and the ↑ ↓ button for the order; clicking a column title also sorts, a second click reverses the order. Records without a value stay at the end; numbers are sorted naturally (AR2 before AR10).

- **Species and localities**: the list of species and the list of localities of the displayed samples (or of the selection), with the number of samples and their numbers, sorted by name or by count; **Copy names** or **CSV**. A mineral page shows how many of its specimens are in the collection.

- **Summary**: a summary document of the samples shown (or of the selection): key figures (specimens, species, localities, elements, collection years, countries), **minerals** (formula, chemical class, number of specimens and their numbers), **chemistry** (Nickel-Strunz classes, given by Wikidata for about 4,700 species, otherwise derived from the formula, and elements present), **localities** and countries, specimen types, acquisition modes, collectors, and optionally the **list of specimens**. The title can be edited ("AR collection" by default with the AR filter). **PDF** opens the print window: choose "Save as PDF" (A4, laid out for printing; allow pop-ups if nothing opens, chapter 21). **Markdown** downloads the same content as structured text (`summary_AR_….md`), readable in any editor or convertible to Word. Formulas and elements come from the local species database (Mindat, or the Wikidata list without a key).

- **Number prefix**: when numbers start with two letters (AR001, CH012…), a **No.: all** menu next to the search shows only those with one prefix ("No. AR…", with their count), or the numbers without letters. It combines with the search; the box at the top of the column then ticks all the samples shown. Exported files carry the prefix in their name (`my-collection_AR_…`, `mindat-explorer_records_AR_…`).

- **Keeping only part of the collection** (for instance the "AR" ones):
    - *careful*: **Back up everything** first; choose **No. AR…**, **Export** → **Full records (.json)**; then **Restore** that file → **Replace the collection**. Only the collection is replaced: wishes, favourites and preferences do not change. With **Add**, the file's records are added (or update the same records): this is also the way to move part of the collection to another device or person;
    - *direct*: tick the samples to keep, then **Keep only the selection** (the others are deleted after confirmation; make a backup first).
    - The **CSV** export is for reading the list in Excel; it cannot be reloaded as is (some fields are simplified). To reload, use the **full records (.json)**.
- **Edit (n)**: bulk edit of the ticked samples, for instance to give them all the same locality or the same collection date. Tick the fields to change (locality, sampling point, collection date, collector, type, acquisition mode, date and source, storage, duplicate for trade, species, notes): the value entered replaces that of each record, unticked fields do not change. Entering a value ticks the field; a ticked field left empty is cleared (a warning says so). **Species** are added to those of each record, or replace them if you choose; **notes** are appended to the existing notes.
- **Labels**, in two formats:
    - **standard** (8.5 × 5.5 cm): species, locality and sampling point, collector and collection date, type and dimensions, no., date and source;
    - **micromount** (2.5 × 2.5 cm, for the lid of a 1-inch box, 7 per row on an A4 sheet): species, locality and point, collector and date, no.

  For the selection or the whole displayed list., for the selection or the whole displayed list;
- **Export** (the selection, or the whole displayed list):
    - **CSV (Excel)**: a table for Excel;
    - **Darwin Core (Excel)**: the same columns in a workbook, to view the file in Excel;
    - **Darwin Core (CSV)**: the exchange format of museums and the GBIF portal (TDWG standard), one row per specimen. The main species goes in `scientificName` (with the link to its Mindat page), the other species in `associatedTaxa`, the number in `catalogNumber`, the specimen type in `preparations`, the notes in `occurrenceRemarks`; dimensions, weight, storage and acquisition, which have no Darwin Core term, in `dynamicProperties`. The sampling point goes in `locationRemarks`, the collection date in `eventDate` (a range is written `1777/1800`; an unrecognised form goes in `verbatimEventDate`), the collector in `recordedBy`. Without a date or collector, a self-collected specimen takes the acquisition date and your name (sharing settings). UTF-8 file, comma-separated: in Excel, open it with **Data** → **From Text/CSV**;
- **Delete**: the ticked records.

Backing up: essential

Collection, wish list, received lists, favourites, history, comparison and preferences are stored **in this browser only**: they do not move from one computer or phone to another, and would be lost if the browser data were cleared. The backup panel, at the top of My collection (and of the Favourites page, and

in the 🔑 settings), shows the date of the last backup; it turns orange when a backup is missing, your data has changed since, or it is over a month old.

- **Back up everything** creates **two files with the same content** (all this data, not the API key): `mindat-explorer_backup_YYYY-MM-DD.json` and `mindat-explorer_backup_YYYY-MM-DD.xlsx`. The second opens in Excel or LibreOffice (one sheet per topic: Specimens, Wish list, Favourites…), handy to read or print your collection. Keep them somewhere safe (USB stick, cloud…). If the browser asks to allow several downloads, accept.
- **Restore** reloads **either** file, here or on another device, even without a Mindat key: **Add** (completes your data, identical items are updated) or **Replace**. Only the JSON column of the Excel file is used for restoring: changes made in Excel are not taken into account. Older files (collection-only backup, favourites export) are no longer accepted.

The "Clear favourites, history and comparison" button in the settings does not touch the collection.

Wish list

Wish list tab: the species you are looking for, by exchange or purchase. Add them here (**Add a wanted species**; without a key or when Mindat does not respond, the search uses the local database), with the ♡ **Wish** button on a mineral page, or from "What I'm missing". For each: priority (★★★ top, ★★ normal, ★ if the chance arises), preferred locality, size or quality. **Acquired** creates the specimen record and removes the species from the list. **Print** prepares a list for a show; **Share (file)** creates a file to send to other collectors.

Duplicates for trade

Duplicates for trade tab: the specimens marked "Duplicate offered for trade". **Print** or **Share (file)** the list. Your details (name, contact), optional, appear at the top of printed lists and in shared files.

Received lists: **Open a received list** loads the duplicates or wish list another collector sent you (file shared from Mindat Explorer). Matches are flagged:

Received list	Flagged
their duplicates	"on my wish list", "not in my collection"
their wishes	"I have a duplicate", "I have it"

Matches only hides the rest. Received lists do not change your collection; ✕ deletes one.

What I'm missing

What I'm missing tab: the species of a scope compared with your collection. Choose the scope:

Scope	Species compared
Locality or area	those reported at a mine, municipality, department, region or country (sub-localities included); also via the **What I'm missing here** button on a locality page
Element	IMA species containing one or more elements (`Cu`, `Pb Sb`…), as an essential element or not, filtered by frequency
Group	the members of a Mindat group (`Garnet Group`, `Tourmaline`…); its subgroups are offered
Common species	the most widespread worldwide (≥ 5,000, 1,000, 500 or 100 localities)

The result shows your progress ("You have 12 of the 297 species", with a bar), then the missing species, from the most widespread (easier to find) to the rarest, or type locality first (👑, locality scope). **Add to wishes** puts them on your wish list; **Print the search list** prepares a list to take to a show. Species already in the collection are listed separately.

Examples: the whole Var department (297 species), copper among species known from at least 100 localities (92 species), garnets (19 species), species known from more than 1,000 localities (142).

Choose a locality around a point (locality scope): (1) **My position**: in mainland France, the department you are in is **chosen automatically** and its localities load, nearest first, with an optional radius (5 to 100 km); nearby departments are offered just below, tap one if the choice is wrong or you are near a boundary; (2) **or choose the area yourself**: type the name of a department (e.g. `Rhône`), municipality or region and click it in the list — Mindat cannot search directly around a position, so an area is always needed; (3) click a site to see the species you are missing. In short: pick an area (municipality, department…) and, if you wish, your position; the area's localities appear on a map and in a list, sorted by distance, filterable by element and type; click one to see what you are missing from it.

> This list only places the known localities around a point; it does not invite anyone to go to these sites. For any visit, always ask the owners and operators for permission, and respect private property and local regulations. Old mines and adits are dangerous and usually off limits. Mindat coordinates may be approximate.

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18. Expert mode

Expert mode pages

At the bottom of the menu, under "Expert mode": **Composition (EDS)**, **Formula**, **Analysis tools** and **Local database**. They are available directly, with no setting.

The local database

Expert tools work on a local copy of the roughly 6,200 IMA species (formula, elements, frequency, physical properties), downloaded into the browser (about 3 MB, 7 Mindat requests) and resynchronised automatically after a month. A copy older than a month is still used straight away while the update runs in the background; if it fails (no Internet, no key, Mindat down), the previous copy is kept. It is also the

fallback for the Minerals page when Mindat is not responding (chapter 4). The **Local database** page shows the number of species, the synchronisation date and the size; it lets you **synchronise now**, **export** the database (CSV for Excel, or JSON) and delete it. The **What's new** panel lists species added since the previous synchronisation. The Elements page uses the same database.

Without the Mindat database: the Wikidata list. As long as the Mindat database is not downloaded (no key, Mindat unavailable, first download in progress), the application uses a list of **6,150 IMA species** shipped with it, taken from **Wikidata** (public domain, freely reusable) and kept for offline use. With a key, the Mindat database downloads in the background and takes over as soon as it arrives.

- It contains: name, **French name** when there is one (about 1,350), formula (5,586 species), elements, IMA status, crystal system (85%), sometimes hardness, and, in a **Wikidata details** panel of the reduced record: **Strunz class** (4,736 species, with its name: "4.DA.05 — Oxides and hydroxides"), Dana class, **space group**, **name origin** ("Named after") and **type locality** on a map (4,183 species; see also chapter 6). The My collection summary uses it for the chemical class, even with the Mindat database.
- Two other lists come with it, produced by the same script: **544 rocks** (chapter 14) and **4,125 photos** from Wikimedia Commons (3,783 species, 342 rocks), each with its author and licence (chapter 5).
- It does not contain: frequency (number of localities, shown as "—"; "at least n localities" criteria do not exclude these species), lustre, colour, streak, cleavage, density. Searches on these properties are therefore less precise (Composition, Formula). In **Guided identification**, only the hardness, fizzing and crystal shape questions stay active (the others are greyed out, as is the "among common species" choice); **Compare** shows only formula, elements, crystal system, hardness and status, with a banner saying so. Mixtures and common names ("Wad", limonite) are not in it.
- About half the species (3,019) carry their **Mindat number**: a My collection record created with it is the same as with Mindat. The others have a reduced record "No linked Mindat record", with a **Search mindat.org** link; in My collection they are **linked to Mindat automatically**, by name, once the Mindat database is downloaded.
- The **Local database** page shows "Source: Wikidata (shipped list)" and offers **Synchronise now** to download the Mindat database.

Search by composition (EDS)

Composition (EDS) menu. To find a species from the order of abundance of its elements and their approximate ratios, for example from a semi-quantitative EDS analysis.

- **Elements, from most to least abundant**: `S > Sb > Fe`. ">" means more atoms, "=" about as many (within the tolerance): `S > Cu = Fe`. From 2 to as many elements as you like; capitals optional (`s > sb > fe`).
- **Ratios** (optional), in numbers of atoms, separated by ";": `S = 2 Fe`, `Sb/Fe = 1.5`.
- **Tolerance** ("about"): from ± 5 to ± 60%; it applies to ratios and to "=".
- **Other elements accepted**: none, up to 10% or 25% of atoms, or no limit.
- **Ignored elements**: left out of the proportions. H is ignored by default (EDS cannot detect it); also ignore O for an analysis where oxygen is not measured.
- **Frequency**: keep only species known from at least 10 or 100 localities.

Results show (with ⭐ favourite and ⇄ compare on each row) the formula, the atom proportions of the requested elements (and the share of the others), the computed ratios and a **deviation** (0% = perfect match), used for the ranking.

Input	Result
`S > Sb > Fe`	berthierite ($FeSb_2S_4$)
`S > Fe` and `S = 2 Fe`	pyrite, marcasite
`S > Cu = Fe`	chalcopyrite first
`Fe = As = S`	arsenopyrite
`O > Si > Al = K`	microcline, orthoclase, sanidine…

Proportions come from Mindat's **ideal formulas** (about 6,200 IMA species, loaded with the Elements page statistics): a real composition may differ (substitutions, zoning), hence the tolerance.

The **Properties (optional)** panel, below the criteria, adds those of the mineral search: diaphaneity, colour, streak, lustre, cleavage, density, hardness, crystal system, tenacity, fracture. Example: `S > Fe`, `S = 2 Fe` and "Isometric" leave only pyrite.

Search by formula

Formula page: enter a formula, or paste an analysis, to get the closest species, ranked by **similarity** (100% = same composition).

- **Formula**: text (`CuFeS2`), IMA formula with charges (`Cu1+6(Cu1+4Fe2+2)Sb3+4S2-13`), formula copied from Mindat, Unicode subscripts (`CaSO₄·2H₂O`). An exact IMA or Mindat formula gives the mineral, marked **identical** (several species if they are polymorphs, such as rutile, anatase and brookite).
- **EDS analysis** in atomic percent, for example an rtx export line: `LC031-1_1_1 8 O79.0 Ti16.1 Si1.7 Ca1.6 As0.5 Fe0.5 Al0.4 Cu0.1 Ag0.0` (the leading label is recognised). The input type is detected automatically.
- **Elements not analysed** (H, Li, Be, B by default for EDS): neither counted nor required.
- **Elements present, not quantified** (O by default for EDS; C if needed): the species must contain them, but their proportion is not compared (oxygen overestimated…).
- **Trace threshold** (1% by default for EDS): analysis elements below it are removed from the input; a species rich in them is still penalised.
- Frequency (up to ≥ 1,000 localities) and **properties** as for the composition search; **Clear all** resets the page.

The table compares input and species proportions element by element; ⭐ adds to favourites, ⇄ to the comparison. For the analysis above, Ti 83%, Si 9%, Ca 8% (traces As, Fe, Al, Cu, Ag removed, O not quantified): rutile, anatase and brookite at 83%, titanite and ilmenite at 50%.

Importing a batch of analyses: the **Import EDS analyses (.xlsx)** button, below the input panel, reads an Excel workbook with one row per analysis and one column per element, in atomic % (for example the rtx-mineral-id “Summary” sheet).

- The application uses the “Summary” sheet if there is one, otherwise the first suitable sheet. It finds the header row: the analysis name (“Point” column…), then the element columns (O, C, Si, Fe…); other columns are ignored.
- Analyses are sorted into **Validated** and **Not validated** from the workbook's “Validated” column (“✓ Modified”) or, failing that, from the **green colour** of the name.
- Clicking an analysis loads it into the search; ‹ › moves to the previous or next one of the group shown. The mineral proposed in the workbook (“Top mineral”) is recalled under each analysis.
- The file stays in the browser; the batch is kept until the tab is closed (**Close** removes it).

Analysis tools

Analysis tools page, two tabs.

Conversions and structural formula. Paste an analysis:

- in atomic %, for example an EDS line (`O79.0 Ti16.1 Si1.7 …`, rtx export included);
- in element weight % (`Fe 46.55 S 53.45`);
- or in oxide weight % (`SiO2 64.76 Al2O3 18.32 K2O 16.92`), recognised automatically.

For each element, choose how it is expressed: oxide at the chosen valence (FeO or Fe_2O_3, As_2O_5 or As_2O_3…) or **element** (sulfur in a sulfide, halogens). Oxygen is the measured value, or **calculated by stoichiometry** if you tick it (always for oxide input). The table gives, normalised to 100: atomic %, weight %, oxide and oxide weight %.

The **structural formula** (atoms per formula unit) is normalised on N oxygens (4 olivine, 6 pyroxene, 8 feldspar, 12 garnet, 23 amphibole, or any value) or on N cations. Examples: orthoclase gives Si_3AlKO_8, olivine $Mg_{1.8}Fe_{0.2}SiO_4$, pyrite FeS_2 (on 3 cations). **Find the matching species** sends the formula to the Formula page.

EDS interferences. Enter the detected or suspected elements (`S Pb Mo`), or take those of the analysis. Set the gap treated as an interference (100 eV by default; an SDD detector resolves about 125 to 135 eV). The page lists:

- **overlaps between these elements**: S Kα / Mo Lα / Pb Mα, Ti Kβ / V Kα, Ti Kα / Ba Lα, As Kα / Pb Lα (7 eV apart)…;
- for each element, its lines (Kα, Kβ, Lα, Lβ, Mα, in keV) and the **other elements** that could be mistaken for it.

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19. Resources

The **Resources** page (menu, home page, and "Resources (documents)" link on the welcome screen) gathers documents to view or download. It is **available without a Mindat key**. Each document shows its format, size and, for data, the date of the Mindat data; **Open** displays it in a new tab, **Download** saves it.

Document	Content
Top 100 French localities (PDF, in French)	localities ranked by number of IMA-approved species, questionable occurrences excluded, with breakdown by region and method. The ranking is based on Mindat data only: it does not reflect reality for sites whose Mindat page is not up to date
Top 100 French localities (CSV)	the same data, for Excel
User guides (PDF)	this guide, in French and English

> This list is for documentation only: it does not invite anyone to visit the sites, which are often private, protected or dangerous.

For the site administrator: documents are placed in the same directory as the application; the list shown comes from the `ressources.json` file, to be extended to add a document (title, description, date).

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20. Offline use (phone)

Installed on a phone (chapter 1), the application also works **without a network** (no coverage, underground), for localities kept beforehand.

1. **Once, with a network**: install the application on the phone (chapter 1, “Installing the application”). An “Explorer” icon appears.
2. **Before going out, with a network**: tap **Keep offline** on a locality page, in the "Localities around me" list (Offline column), or on the **Offline** page ("Add a locality", or its "Localities around me" panel). The page, its species list (sublocalities included) and each species' record are downloaded: a few seconds per locality, about 100 KB.
3. **Without a network**: open the application from its icon. A blue "No network" banner leads to the **Offline** page: kept localities, then for each one its species with a search (name, formula or element), and tapping a species shows its properties (formula, system, hardness, density, colour, streak, lustre, cleavage…).

On the Offline page: **Update** (with a network), **Print / PDF** (the locality's species list, to save as PDF) and **Remove**. The data stays on the phone with no time limit. My collection, favourites and the local-database tools (if downloaded) also work without a network; maps and Mindat searches need a network.

> On iPhone, use the installed application (icon) rather than a Safari tab: iOS may clear the data of a little-used site.

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21. Troubleshooting

Symptom	What to do
Red banner "API key rejected"	🔑 → check the key → Test connection
Orange banner "Mindat is not responding"	most likely the Mindat API is temporarily unavailable (this happens often); try again later. Otherwise, check your Internet connection. Meanwhile, the Wikidata lists (species, rocks, photos), identification and your data remain available
"Mindat is not responding" (timed out, error 502, 503 or 504)	the Mindat server is overloaded: try again later; meanwhile the Minerals page searches the local database (chapter 4)
"Too many requests"	Mindat allows about 1,000 requests per hour: wait a little
A rock cannot be found	try part of the name, or its English name
No results	loosen a filter; remember English names; choose "All entries" to include varieties and synonyms
Empty or grey map	the place has no coordinates (shown at the bottom left of the map)
Data that seems out of date	🔑 → Clear cache
The install button does not appear	chapter 1, “Installing the application”: installing is done in the browser, at the https://… address; reload the page once
A backup, export or import does not download	see below, “Blocked downloads and windows”
Labels or a printable list do not open	window blocked by the browser: see below

Blocked downloads and windows

Backups, **exports** (CSV, Darwin Core, JSON) and sample files are **downloads**. **Labels** and printable lists open in a **new window**. The browser may block either, often without a clear message. The settings are changed **in the browser**, not in the application.

> The permission applies to **the whole site** `https://hydrogeologie.com`: browsers do not allow limiting it to the `/mindat-explorer/` folder alone.

Edge (computer), especially with the installed application

After a first download, Edge often blocks the next ones (“multiple downloads”): the backup seems to do nothing. The installed application's window has no address bar to allow it: go through the browser.

1. Open **Edge** (the browser itself, not the Explorer icon).
2. Type in the address bar: `edge://settings/content/automaticDownloads` then Enter. (Via the menus: **…** → **Settings** → **Cookies and site permissions** → **Automatic downloads**.)
3. Under **Allow**, click **Add** and enter `https://hydrogeologie.com`, then **Add**.

4. For labels: same settings page, **Pop-ups and redirects** section (`edge://settings/content/popups`) → **Allow** → **Add** → `https://hydrogeologie.com`.
5. Close and reopen the application, then run the backup again.

In the browser (without the installed application), a crossed-out download or blocked window icon appears at the end of the address bar: click it → **Always allow** for this site.

Chrome (computer): same principle as Edge. Settings addresses: `chrome://settings/content/automaticDownloads` (automatic downloads) and `chrome://settings/content/popups` (pop-ups) → **Add** → `https://hydrogeologie.com`. In the browser, the icon at the end of the address bar also offers **Always allow**.

Firefox (computer): label windows may be blocked (yellow bar "Firefox prevented this site from opening a pop-up window") → **Options** → **Allow pop-ups for hydrogeologie.com**. If Firefox asks where to save each file, that is a Firefox setting (**Settings** → **General** → **Downloads**), harmless.

Safari (Mac): on the first download, Safari may ask "Allow downloads on hydrogeologie.com?" → **Allow**. Permanent setting: **Safari** → **Settings** → **Websites** → **Downloads** (and **Pop-up Windows** for labels) → hydrogeologie.com → **Allow**. Files go to the **Downloads** folder.

iPhone and iPad

- A download asks "Download …?" → **Download**. The file goes to the **Files** app → **Downloads**. In the home-screen application, the file may open as a preview: **Share** button → **Save to Files**.
- To **restore** a backup, pick the file in the Files app (Downloads, iCloud Drive…).
- Label windows: iPhone **Settings** → **Safari** → turn off **Block Pop-ups** (for Safari; the home-screen application generally follows this setting).
- Reminder: iOS may clear the data of a little-used site in Safari. **Back up often** and keep the file in the Files app or iCloud Drive.

Android (Chrome, Edge): files go to the phone's **Downloads** folder (notification at the top of the screen). If nothing happens: ⋮ → **Settings** → **Site settings** → **Automatic downloads** (and **Pop-ups and redirects** for labels) → allow hydrogeologie.com.

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22. Privacy and data

The key, favourites, history, collection and cache stay **in your browser**; nothing is sent anywhere except to api.mindat.org. Map backgrounds come from Esri and photos from Wikimedia Commons: these sites only see which tile or photo is requested. On a shared computer, clear the key in the 🔑 settings after use.

Data © Mindat.org and its contributors, free for non-commercial use with attribution. Mindat Explorer is an independent application, not affiliated with Mindat.

Credits

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