

Radioactive minerals – Safety of handling and storage in home collections

- Do not handle the material more than necessary.
- Whenever possible, use handling aids (pliers, tweezers, etc.).
- When handling radioactive material, use disposable gloves, if possible. Never reuse gloves; it is better to work without gloves and wash your hands thoroughly after work. As with clothing, respirators, masks, etc., it is important to learn how to take them off. Usually, gloves are pulled on from the fingertips and then the hem is pulled over the hand in one go to roll them up with the dirty side inward. Before you roll one hand up completely, help the other hand up partially so that you do not have to touch the hem with a clean hand.
- When handling, do not touch anything that you do not want to contaminate with radioactive dust.
- Do not handle the material near food, in areas where food is stored, prepared or consumed.
- Do not lick or sniff the material, do not eat, drink, smoke or touch your face while working with it.
- A radioactive sample should never be examined with a small mineralogical magnifying glass, as this would expose the eye and surrounding tissue to an increased dose in close proximity to the sample.
- Further processing of samples at home is not recommended; consider the suitability of such activities in the backyard or garden. Contamination by flying material cannot be sufficiently prevented when formatting samples.
- We also do not recommend cutting or grinding samples. If you decide to cut and grind, do so only with the use of water cooling and spraying, with a respirator of at least FFP3 and very thorough cleaning after work. Even with water mist, especially when cutting with a diamond saw, extensive fine contamination of the surroundings will occur.
- When handling the material, prevent the formation of dust, work, if possible, on a disposable mat, which you will then throw away in the trash (old newspapers, etc.).
- In the case of dusty samples (e.g. coatings of earthy uranium ochres) or for longer work, use an FFP3 respirator, or even tight (hermetic) glasses. Throw away the respirator after use, wash the glasses very carefully with soap or detergent.
- If you work with radioactive minerals more often, it is advisable to use clothing and footwear designated for this purpose (laboratory coat, etc.).
- After finishing work, clean up the dust around the work area well, preferably with disposable wet wipes that you will throw away in the trash, wipe the floor, preferably again with a disposable cloth, rinse all tools used, or take a shower and have the clothes you worked in washed. For frequent work, a regular lux with a HEPA filter is worth it, but we don't use it anywhere else.
- If you have worked with luminescent uranium products, the cleaning can be checked in the dark with a UV lamp.
- Always wash your hands thoroughly with soap after work, even if you have used gloves.
- If you are not using the material, store it in a closed container (bag, box, cabinet, etc.), the most suitable permanent storage is in an airtight glass jar or a plastic box sealed with silicone glue (prevents radon leakage) - hermetically sealed. Store dirty work clothes in the same way.
- Radioactive samples should always be marked (warning symbol). Remember that something could happen to you, someone might inherit your collection and out of ignorance they could then be at risk due to incorrect handling or storage.
- If you have more samples, it is advisable to keep them all together – in one drawer, in one part of the display case etc., and to also mark the drawer or specific shelf of the display case with a warning sign. This will also reduce the level of possible contamination of other samples in the collection. Some sources state a different procedure, where the samples should be scattered as much as possible across the display cases or drawers, thereby reducing the strong radiation from one place. However, in our opinion, this is of importance for museum display cases and depositories, not for small collectors, and it certainly increases the demands on the amount of shielding material.
- Remember to place it appropriately with respect to potential neighbors, especially in the case of thin walls of apartment buildings, etc. It is not advisable to have your collection next to the wall behind which your neighbor sleeps, just as you should not store it in your own bedroom or kitchen.
- Keep the material out of reach of children and animals, especially if children or strangers have access to the collection; radioactive samples should be locked. Never allow children to touch (or be able to touch) radioactive samples directly. This is especially true for samples in school collections.



- Keep your specimens as small as possible (yes, this hurts enthusiasts a lot). Store highly active, large or storage specimens in shielded storage areas - simply, mainly outside residential areas, of course marked and secured from strangers, children, animals.
- If you handle radioactive samples more often, wear goggles to protect your face and eyes, especially from alpha and beta radiation, or better yet, a transparent protective face shield. The eyes and mouth, and to a lesser extent the nose, are not protected from alpha or beta radiation.
- If you have a deposit with a large number of samples, individual pieces can be packed in sealable plastic bags and stored in a plastic box (reduction of dust contamination, easier cleaning). The plastic box should be marked with a warning sign.
- In the case of disposal, never throw radioactive samples into municipal waste, you will cause problems - for example, incinerators have very sensitive detectors and because of your one ton they have to dump it in the yard and disassemble the waste from the entire garbage truck. (Of course, you can throw the newspapers you worked on with the samples into municipal waste - possibly with small grains of material.) If you are not able to offer the samples to another collector, museum, school, it is ideal to return the stone where it belongs, to the heaps in Příbram, Jáchymov, etc. You can also feel free to contact any regional office of the State Office for Nuclear Safety (<https://www.sujb.cz/o-sujb/kde-nas-najede-spojeni/spojeni>), where they will be happy to advise you.

Recommendations for hand and cabinet collections:

- A few mineral specimens (smaller in size, maximum approx. 200 $\mu\text{Sv}/\text{sample}$) only require careful handling and a glass pane between you and the sample, a suitable distance of the display (collection) from the places of most frequent stay and airtight closure against radon.
- Radioactive powdery and earthy minerals, such as uranium ochres, zippeite, autunit, require consideration of preventing the spread of radioactive dust. Here airtight closure has a double meaning.
- Systematic collection of uranium and thorium minerals in particular, larger and more active samples (over approx. 500 $\mu\text{Sv}/\text{sample}$) cannot be recommended for residential premises. Here it is always appropriate to store such samples in structurally separate rooms, with ventilation and possibly shielding for larger collections.

It is estimated that typical handling of radioactive minerals in a general mineralogical collection usually involves about 10 hours per year with an average handling radius of about 100 mm. Reaching the maximum annual dose (approximately 1 mSv) can reasonably be considered an acceptably low risk. This would mean that handling radioactive minerals for those 10 hours with an average dose of 100 $\mu\text{Sv}/\text{h}$ would not exceed this limit. Of course, smaller sources of radiation could realistically be handled for a proportionally longer time. Conversely, a mineral emitting 1,000 $\mu\text{Sv}/\text{h}$ would reach this dose limit in just one hour. (5)

The current dose limit for the general public is 1 mSv per year. To obtain the maximum annual dose, a person would have to be exposed to a sample of 1 $\mu\text{Sv}/\text{h}$ for more than 1000 hours or a sample of 7.5 $\mu\text{Sv}/\text{h}$ for more than 133 hours.

Full article: <https://www.mallorn.cz/news/radioaktivni-minerality-bezpecnost-sber-preprava-a-skladovani-v-domaci-sbirce/>

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