



WORKING WITH

GEMSTONES

HARDNESS - TOUGHNESS - STABILITY

Discover everything you need to know about gemstones. This guide will save you from losing precious stones (and your mind) to avoidable mistakes!



HOLD UP!

Before diving into this, please be aware this is just a short tutorial on gemstone durability and things that you'll need to consider when purchasing gemstones for stone setting. We're not covering any setting techniques in this one. If you don't have any setting experience yet, or simply want my support and guidance with more in-depth classes on stone setting and all things metalsmithing, it just so happens I have plenty of classes ready and waiting for you if you need them!

And to help you get started...



I WANT TO GIVE YOU A GIFT

If you've been following me for a while, you know how much I love giving away freebies (and prizes). So I want to gift you 7 Days of FREE Unlimited access to the Metalsmith Academy so I can arm you with all the skills you need to nail down those skills. Plus, I'll teach you soldering, bezel setting, prong setting and so much more! If you're keen, checkout the deets below, or if you're ready to dive in and get started with your snowflakes, just skip the next page!



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Anyway, enough of the advice and "sales pitch" already Lucy!
Let's dive in and start talking about all things saw piercing

When selecting gemstones, understanding their fundamental properties is super important. Three main properties: hardness, toughness, and stability



– determine how well a gemstone is going to hold up to wear, and the setting process. However, as you'll see, there's a bit more to it than that!!



- **Hardness:** The hardness of a gemstone, measured on the Mohs scale, indicates its resistance to scratching.
- **Toughness:** The toughness of a gemstone is its ability to withstand impact or pressure without breaking. Glass is hard, but not tough. Plastic is soft, but much harder to break than glass. Treatments, cut and the quality of a gemstone can all impact a stone's toughness.
- **Stability:** This refers to a gemstone's resistance to environmental factors including heat, light, and chemicals. Certain gemstones, especially those with inclusions, are sensitive to thermal shock, whilst others react very badly to certain acids - including those used when pickling.

GEMSTONE HARDNESS



USING THE MOHS SCALE OF HARDNESS

THE MOHS SCALE

The Mohs Scale of Hardness is a list of 10 minerals in order of hardness from 1 - 10 with 1 being the softest and 10 the hardest. Every mineral fits somewhere in this list. Minerals higher on the list will scratch minerals lower down. However, the list is a non-linear scale: The difference in hardness between 8 (topaz) and 9 (corundum) is actually much smaller than the difference between corundum and diamond which holds the top spot at number 10. We'll get into the nitty gritty details shortly!

1. Talc

2. Gypsum

3. Calcite

4. Fluorite

5. Apatite

6. Orthoclase Feldspar

7. Quartz

8. Topaz

9. Corundum

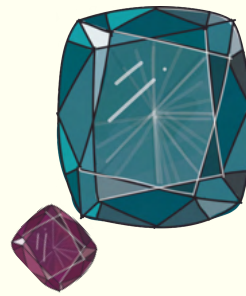
10. Diamond



Agate

MOHS
HARDNESS:

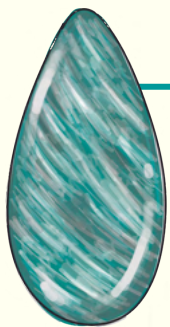
7



Alexandrite

MOHS
HARDNESS:

8.5



Amazonite

MOHS
HARDNESS:

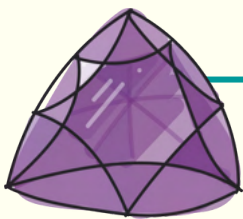
6-6.5



Amber

MOHS
HARDNESS:

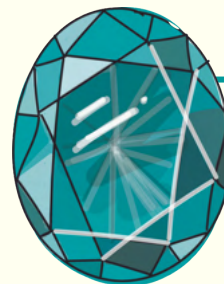
2-2.5



Amethyst

MOHS
HARDNESS:

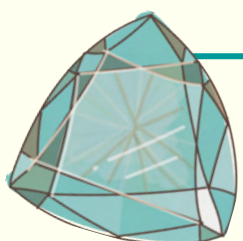
7



Apatite

MOHS
HARDNESS:

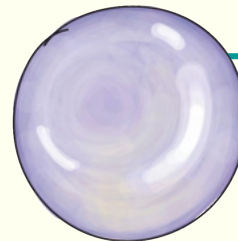
5



Aquamarine

MOHS
HARDNESS:

7.5-8



Chalcedony

MOHS
HARDNESS:

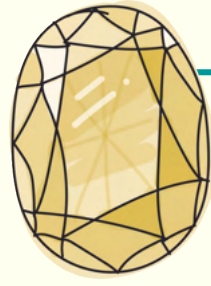
7



Cheysoprase

MOHS
HARDNESS:

7



Citrine

MOHS
HARDNESS:

7



Diamond

MOHS
HARDNESS:

10



Emerald

MOHS
HARDNESS:

7.5-8



Fluorite

MOHS
HARDNESS:

4



Green Amethyst (Prasiolite)

MOHS
HARDNESS:

7



Iolite

MOHS
HARDNESS:

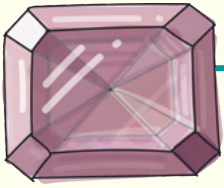
7-7.5



Jasper

MOHS
HARDNESS:

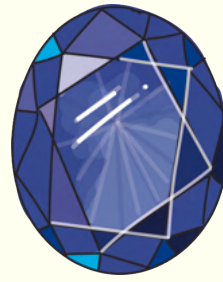
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Kunzite

MOHS
HARDNESS:

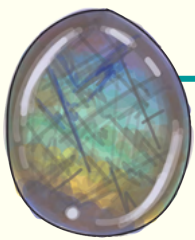
6.5-7



Kyanite

MOHS
HARDNESS:

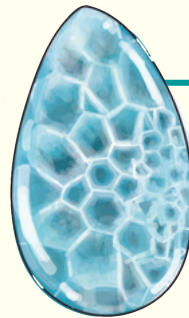
4.5-5



Labradorite

MOHS
HARDNESS:

6-6.5



Larimar

MOHS
HARDNESS:

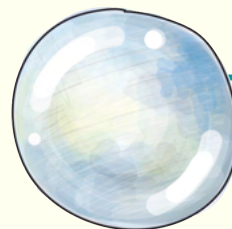
4.5-5



Malachite

MOHS
HARDNESS:

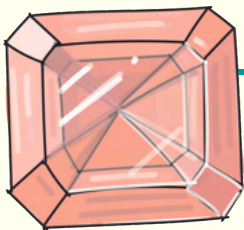
3.5-4



Moonstone

MOHS
HARDNESS:

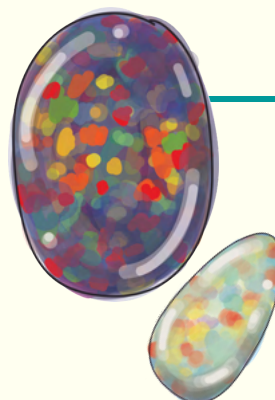
6-6.5



Morganite

MOHS
HARDNESS:

7.5-8



Opal

MOHS
HARDNESS:

5.5-6



Pearl

MOHS
HARDNESS:

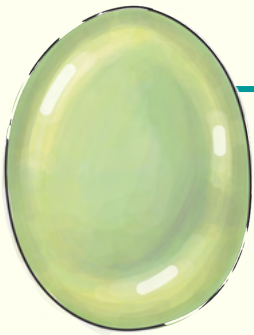
2.5



Peridot

MOHS
HARDNESS:

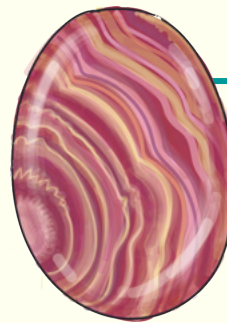
6.5-7



Prehnite

MOHS
HARDNESS:

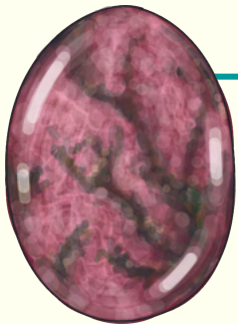
6-6.5



Rhodochrosite

MOHS
HARDNESS:

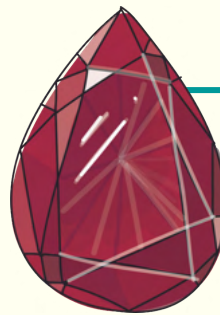
3.5-4



Rhodonite

MOHS
HARDNESS:

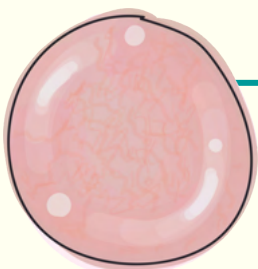
5.5-6.5



Rhodolite Garnet

MOHS
HARDNESS:

7-7.5



Rose Quartz

MOHS
HARDNESS:

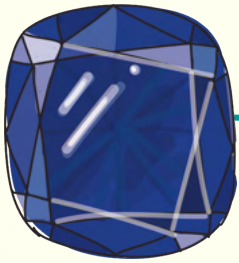
7



Ruby

MOHS
HARDNESS:

9



Sapphire

MOHS
HARDNESS:

9



Smoky Quartz

MOHS
HARDNESS:

7



Spinel

MOHS
HARDNESS:

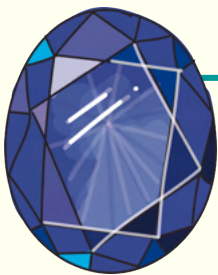
8



Sunstone

MOHS
HARDNESS:

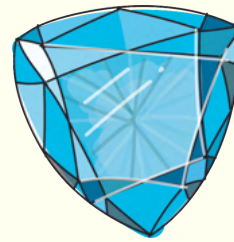
6-6.5



Tanzanite

MOHS
HARDNESS:

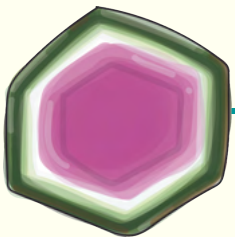
6-7



Topaz

MOHS
HARDNESS:

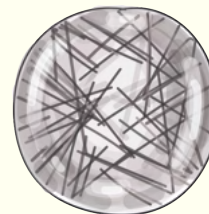
8



Tourmaline

MOHS
HARDNESS:

7-7.5



Tourmalinated Quartz

MOHS
HARDNESS:

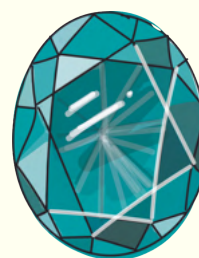
7



Turquoise

MOHS
HARDNESS:

5-6



Zircon

MOHS
HARDNESS:

6.5-7.5

A few very important notes on hardness



FACETTED STONES NEED EXTRA CARE

It's possible (but not ideal) to polish cabochons when set

It's virtually impossible to re-polish faceted stones to their original condition once set. What that means is... be careful not to touch any stones with abrasives, and treat faceted stones like your life depends on it!



BEWARE OF TREATED STONES

Especially glass-filled rubies

The subject of gemstone treatments is huge! Too huge to go into here, but one treatment I do want to warn you about is glass filling which is very common in lower quality sapphires and rubies. The treatment used for these gemstones leaves the stone with two different levels of hardness: the hardness of the stone itself, and the hardness of the much softer filling material.





BEWARE OF COATED STONES

These stones are cheap for a reason, and are often not sold clearly as such

Surface coatings are used on certain gemstones to change their color or to produce iridescent effects. This treatment consists of applying a thin layer of material to the stone's surface, resulting in effects that cannot be achieved with natural stones.

These gemstones are frequently sold under trade names like Mystic Topaz, Aqua Aura Quartz, and Titanium Quartz.

It's important to note that the coatings on these stones are susceptible to damage and can be easily scratched off with careless handling.

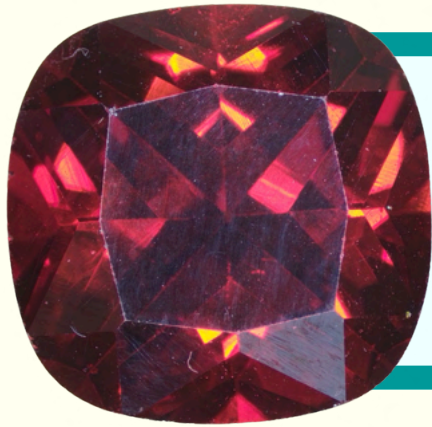
TAKE CARE WITH THOSE ABRASIVES!

Most abrasives are harder than your gemstones

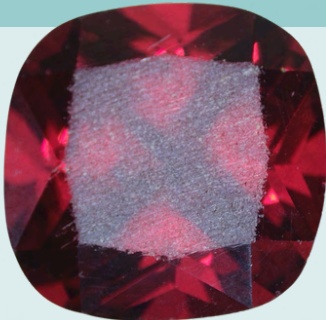


Silicon carbide is used in many abrasives including sandpaper, rubber wheels, satin finishing wheels, and 3M radial wheels. It has a Mohs hardness of 9.5.

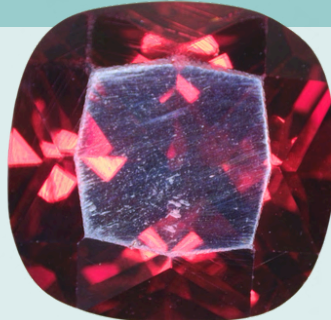
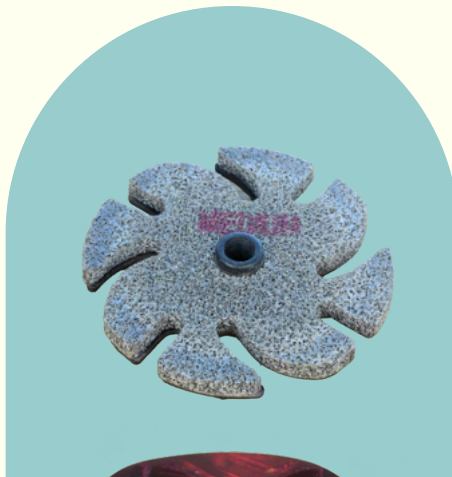
If you touch any gemstone other than diamond with any abrasive finishing product containing silicon carbide, it will affect the stone.



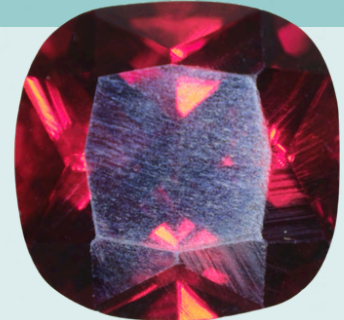
Cubic zirconia has a hardness of 8 - 8.5 on the Mohs scale (it's pretty hard). Let's see how it stands up to 5 seconds of contact with some common abrasives.



100 Grit Sandpaper



JoolTool Medium Magic Eraser



123 Grit 3M Wheel

Whilst coarser abrasives will damage your stones faster, even fine abrasives will round out facet junctions with time.

Remember, the stones above are all cubic zirconia, which is a relatively hard stone. Just imagine what the same abrasives would do to a softer stone such as apatite!

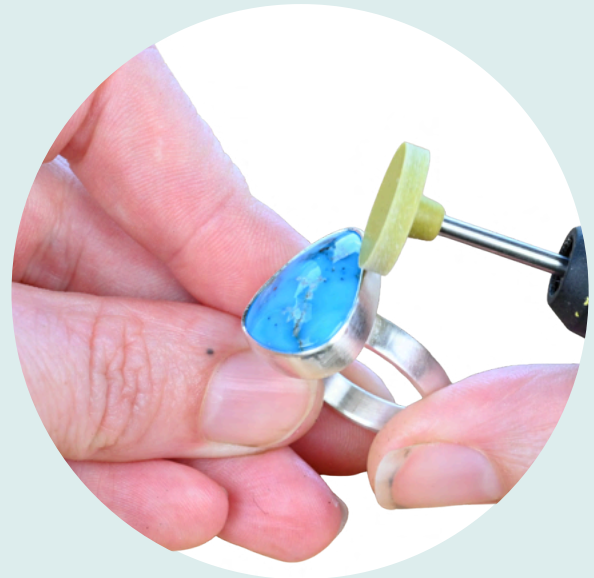




USE PUMICE WHEELS FOR CLEANING UP STONE SETTINGS

Pumice is a much safer abrasive to use around gemstones, especially when just starting out.

Instead of the standard silicon carbide wheels, pumice wheels use pumice as the abrasive. Pumice has a hardness of 6 on the Mohs scale which is harder than most metals, but softer than many gemstones. Pumice wheels shouldn't scratch gemstones rated 6.5 and above on the Mohs scale.



However, they should still be used carefully, as I do feel that with really prolonged use, they may round out facet junctions due to whatever other materials might be present within the rubber. Always take care to avoid touching the gemstone if possible.



Remember though, if it doesn't say pumice in the description or on the label, it is most likely not pumice!



GEMSTONE TOUGHNESS



HMMM - THIS ONE IS A LITTLE MORE VAGUE

Diamond is the hardest natural mineral on the planet. In terms of natural stones, only a diamond can scratch another diamond. But that doesn't mean you can't chip it if you whack it with a setting punch.

Hardness is a material's resistance to scratching only, toughness is a material's ability to withstand breakages. Basically, if you whack it with a hammer, is it likely to shatter? It's a very important question which we shall be putting to the test in order to deliver you answers.

The Gemmological Institute of America rates the toughness of gemstones as: Exceptional, Excellent, Good, Fair and Poor. However, they rate many gems as falling between more than one category - so this really isn't clear cut!

EXCEPTIONAL

Jadeite and Nephrite
Jade

EXCELLENT

Corundum (Ruby and
Sapphire)

GOOD

Quartz (Amethyst
Citrine, Chalcedony etc),
Spinel, Chrysoberyl

FAIR

Tourmaline, Iolite, Lapis
Lazuli, Peridot, Garnet,
Turquoise (poor to good),
Emerald (poor to good)

POOR

Malachite, Opal, Kunzite,
Topaz, Zircon, Tanzanite,
Feldspar (Moonstone,
Labradorite)

TOUGHNESS QUOTED FROM GEMMOLOGICAL INSTITUTE OF AMERICA



Just because a gemstone is rated exceptional or excellent, does not mean it's unbreakable.

Toughness is not as clear cut as hardness

Even the GIA struggles to categorize a gemstone's toughness, with many gems spanning across several toughness categories. Emerald, for example, is classified as Poor - Good. This is because in their pure form, with no fractures, an emerald's toughness could be considered "Good". However, the chances of finding such a pure and unfractured specimen (as is the case with emeralds) are rare.

And so, in all honesty, grading for toughness is a messy business, and it's about to get even messier.

A gem such as sapphire is a relatively hard and tough gemstone. When they're in their untreated and inclusion-free state, these should be zero drama to set.

However, just because a gemstone is hard and tough, does not mean every single stone of that variety is. Inclusions (especially fractures) make a huge difference.

But let's take a look at this in action with the help of our hammer!





Ruby is supposed to be a hard and tough gemstone - with a Mohs rating of 9 and a toughness rating of excellent

A ruby has a Mohs hardness of 9, and the Gemological Institute of America rates its toughness as excellent, with one caveat: "except in highly twinned or fractured stones".

Now this is an excellent point made by the GIA, but in my opinion, that little caveat should follow every rating for every stone.



Fractured ruby

If you purchase any gemstone that is full of fractures, you are infinitely more likely to break it if you whack it with a hammer than if it were a clean, fracture-free stone.

FYI this was a very gentle tap with a hammer.



Dead ruby

Amethyst is only rated as good according to the GIA toughness scale. Here, we have an inclusion-free sample.

However, after a very scientific, and slightly less gentle blow than to our ruby, the amethyst is still intact.

Full disclosure, this poor stone received several blows (our ruby only took one).



Eye clean amethyst

Pay attention to fractures and inclusions in gemstones, especially those that reach the surface of the stone.



Front

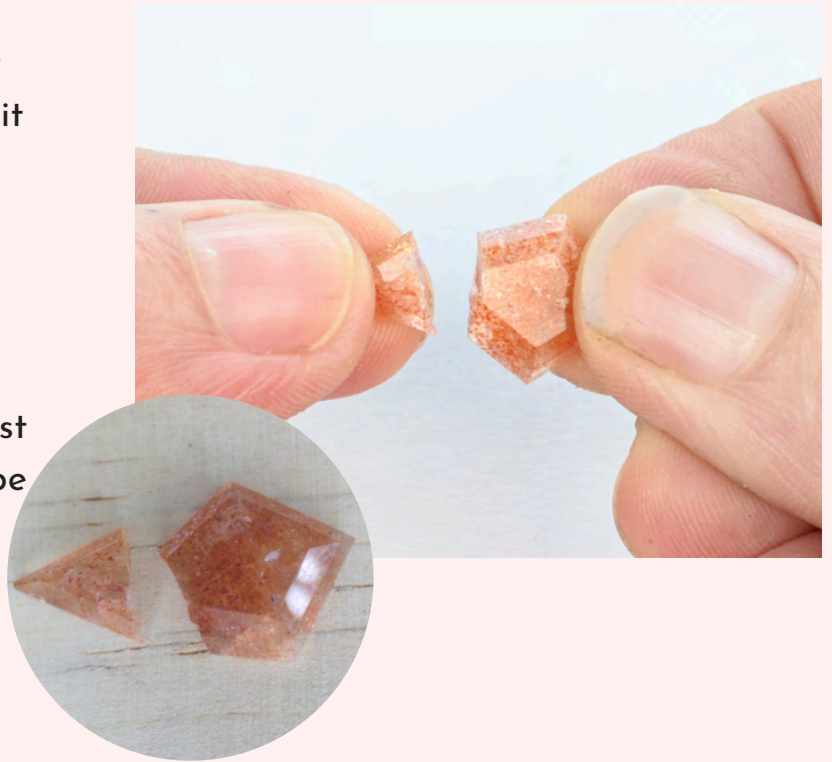


Back

If we take a look at this sunstone, there is a very distinct fracture line visible on the front and the back of the stone.

If I see a gemstone (that I already own), that looks like it has a fracture which may break, just like this sunstone does, I have a trick.....

I simply take the stone and try (pretty aggressively) to break it with my bare hands. This may bring tears of sorrow to your eyes, but the fact is, I would rather have a broken stone on my hands than my customer's. And if you can break it with just your fingers, it shouldn't ever be in jewellery in the first place.



Gemstone Cut and Toughness

One final thing to note with regard to toughness is the effect a gemstone's cut has on it.

Thinner gemstones are more susceptible to breakage than gemstones with a deeper cut. And stones with extreme points are also more susceptible to breakage and need extra care when setting.



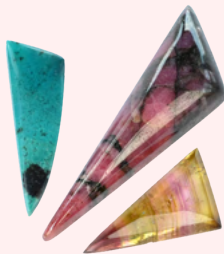
The moral of this story:



Toughness ratings really don't mean that much. Look at your stone, and check for details that will affect its durability such as:



Exceptionally thin cuts



Fine and delicate corners



Treatments such as glass filling



Surface reaching fractures

GEMSTONE STABILITY



THERE'S NO SCALE AT ALL HERE!

IS IT AN ORGANIC GEMSTONE, DOES IT HAVE FRACTURES, IS IT TREATED, OR IS IT JUST PERIDOT OR MALACHITE?!

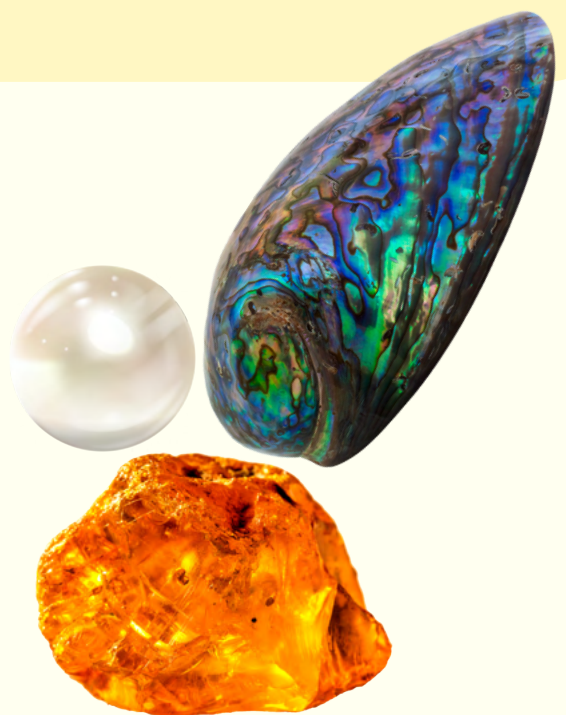


When it comes to stability (a gemstone's resistance to heat, light, and chemicals), there's no scale whatsoever. However, let's just look at a few specifics in detail to help you avoid any dramas!

ORGANIC GEMSTONES

Organic gemstones are gemstones that are formed from a living organism. These include amber, pearls, ivory, and shell.

Very generally speaking, these are more sensitive to solvents, heat, acids, and just life in general. So, extra care must always be taken.



Pearl, shell and amber

FRACTURED GEMSTONES

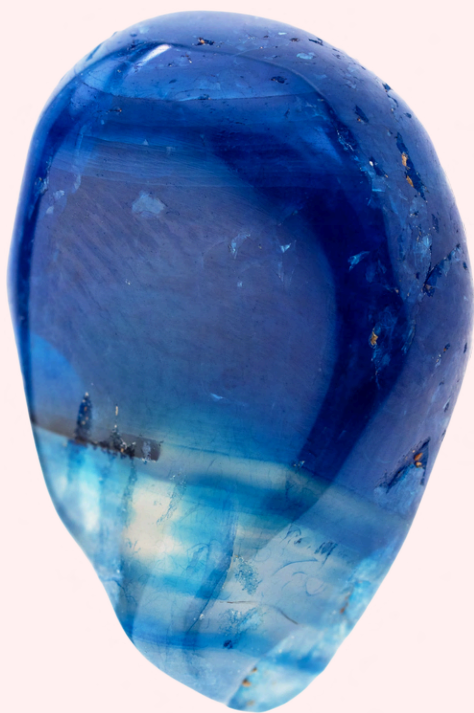
Just as how fractures affect a gemstone's toughness, they also affect its stability. A gemstone with fractures is much more likely to break due to sudden temperature changes or a trip to the ultrasonic cleaner.

Keep all fractured stones out of the ultrasonic cleaner.

If you are setting a fractured stone and are using something like thermoplastic, do not throw the piece directly into hot water. Start with warm water and gradually increase the temperature until it is hot enough to release the piece after setting.



Emerald crystal with fractures



Dyed blue agate

TREATED GEMSTONES

Treatments such glass filling in rubies, or oil / resin filling in emeralds require extra care.

Not only are these stones filled to disguise fractures (see above), but the filler itself can also react badly to chemicals or heat.

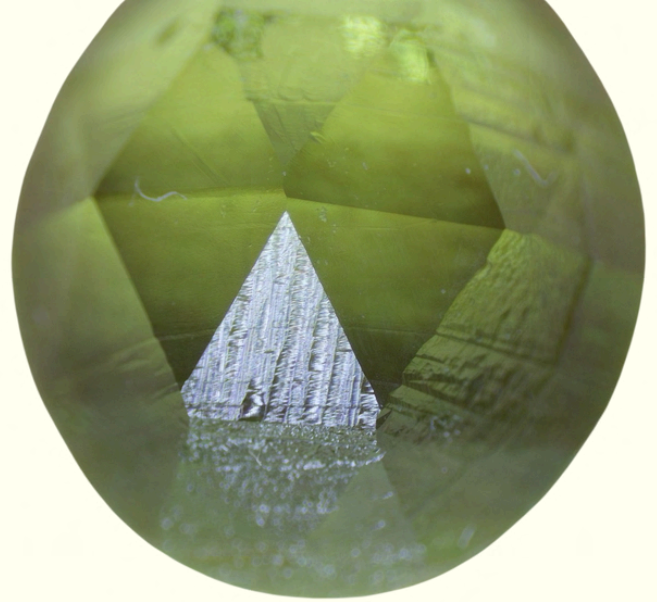
Stones that have been treated with coatings may also have stability issues different from that of the base gemstone.

And lastly, stones that have been dyed such as calcedony or pearls, may fade with exposure to light and chemicals.

PERIDOT

Whilst I can't cover every gemstone in this guide, Peridot is one that needs attention! It is super sensitive to acid!

If you ever have to resize a peridot ring, never ever, ever put it in the pickle.



Peridot surface after several hours in the pickle

LIVER OF SULFUR (AND MALACHITE)

Most of us will have heard of or used liver of sulfur to add a patina to our work at some point or another. And the question that gets asked a lot is which stones can be safely used with liver of sulfur.

I would always be suspect of any porous stones, however Malachite or any copper containing gemstones are particularly sensitive to it.



AND AFTER 1 HOUR IN LIVER OF SULFUR



Well, that was very anticlimactic wasn't it..... After a whole hour in hot liver of sulfur (well it's cold now to be fair), we only managed to totally annihilate a malachite, and cause a little minor disruption to our turquoise. Very surprisingly, the fresh water pearl remains its entirely perfect self (but I'm definitely not going to say it's safe to put pearls in liver of sulfur. That needs more testing!). I'll keep you posted, I promise! Everything else, even the lapis, remains unchanged.





A FINAL WORD

Selecting the right gemstones for your work is tricky, there is no doubt about that.

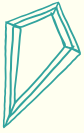
The choices you make impact both the durability of the final piece and the ease of the setting process.

By understanding the roles of hardness, toughness, stability, inclusions, thickness, and treatments, you can make informed choices that reduce the risk of stone breakage and mental breakdowns during the setting process.

Opting for thicker cuts, avoiding stones with sharp edges or surface-reaching fractures, and choosing durable stones like quartz, sapphire, and spinel will increase the likelihood of successful setting experiences.

Ultimately, selecting suitable gemstones is not only about avoiding breakage but also about gaining the confidence to explore and refine your jewelry-making skills.

Lucy xx



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Say hello to **The Metalsmith Academy**: a judgement-free space to learn how to make jewellery like a pro. Access all the training, tools, and support you need to create stunning, high-quality pieces from scratch - without worrying about sawing off your fingertips or setting your house on fire! The doors are open wide, join us inside today and let's start creating stunning jewellery together...

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The Metalsmith Academy is my online hub of goodness where you can learn to create jewellery. It's like a never-ending breakfast buffet of classes, challenges, resources, and daily support from experts and friends to boost your confidence.

Inside, you'll find a tonne of classes, detailed explanations, full-colour handouts and forums on all the topics you need to know to get started in metalsmithing. Our meticulously detailed video lessons show the what and the why behind your creations, so you'll be empowered to design and bring your very own creations to life.

All these goodies are put together by myself and my team - and let me humbly assure you that we know our shiz when it comes to jewellery-making. We've trained with some of the best-of-the-best artisans from around the world, and we're not holding anything back when it comes to spilling those industry secrets and getting you just as confident as we are.

Find Everything You'll Need to Hone Your Skills and Get Unstuck in Your Jewellery Making

Spend a little time in The Metalsmith Academy, and you'll be empowered to:



Get Started With Metalsmithing (Without Losing Your Sanity or Fingertips).

Learn all the basic techniques, essential tools, and safety tips you need to know to become a confident metalsmith. We'll help you lay a strong foundation of skills like sawing, filing, and soldering to carry through the rest of your journey.



Master, Modify and DIY Your Own Tools to Make Your Creations (and life) Easier.



Challenge Your Creativity With the Support of Peers (who can give you a kick up the backside if you need it!)

Stop dreaming about the day you become a skilled, confident jewellery-maker and take your progress into your own hands with modifiable projects to suit your style, templates galore, and creative challenges to push you in the right direction.



Master the Soldering Skills You Need For Every Step Along Your Journey - From Beginner to Pro-Level.



Learn the Skills You Need to Make and Set Bezels With a Perfect Finish Every Time.

From your very first setting project, to advanced bezels for fancy shapes using bezel blocks, you'll learn to master it all. You'll be shocked at how quickly your skills and creativity advance with every bezel setting project you tackle.



Up Your Stone Setting Game Beyond the Basics With Intermediate and Advanced Classes.



Develop Your Own Unique Setting Styles that are Strong, Professional and High-Quality.

Whether you want crisp perfection with your settings, or fun, organic styles, you'll learn how to do them all. Add a splash of fancy pants to standard setting styles, explore new techniques, learn how to use gold on a budget, and so much more.



Become Bat Sh*# Crazy About Texturing and Finishing in all Its Forms (in a good way...)



Create Epic Rings and Put Your Own Spin on The World's Most Popular Piece of Jewellery.

From simple metal bands to show-stopping multi-stone rings, you'll develop all the know-how you need to create stunning rings like a pro. Push your soldering skills to the next level, and confidently work with more advanced metals and stones.



Create Earrings For Everyone - From Hoops, to Drop Earrings, to Simple Studs and More.



Bring Your Designs to Life With Stunning Renders - Any Stone, Any Metal, Any Texture.

Getting inspired is one thing, but getting those designs down on paper is another! We'll show you how to realistically draw and render any piece you can imagine.



Sculpt, Form and Finish All The Unique and Creative Projects Your Heart Desires



You Won't Just Find the Tools & Training You Need Inside the Metalsmith Academy...

You'll Also Find the Support You Need for Every Step Along the Way

You can find me, Vennice, and my team inside the Metalsmith Academy every single day to get your questions answered and get unstuck.

Even more wonderful than us though (if we do say so ourselves) are the other members you're going to meet inside - there are thousands of them! And oh my word you're gonna love them. I'm pretty sure we have the friendliest community of online metalsmith folks in the world. Fun, creative, no-drama peeps who are living their dream of creating jewellery - one shame-free mistake at a time! Learning alongside other real, fabulous humans is what actually makes your jewellery-making experience fun.

No matter where you're at on your jewellery-making journey - from melted messes to sold-out collections - you're welcome inside the Metalsmith Academy. I'm going to stop waffling now, but you can see all the details if you click the link below. I can't wait to see you on the inside.

[Yes! Claim My FREE 7-Day Trial Now](#)

*Cancel anytime, no lock-in contracts



www.lucywalkerjewellery.com