

CYANOACRYLATE ADHESIVE

CA Glue Applications in Woodturning

Cyanoacrylate (CA) glue is the generic name for a group of fast-acting, strong acrylic adhesives. Ethyl and methyl cyanoacrylate are commonly used CA adhesives used in general and in woodworking applications.

Manufacturers use proprietary additives to alter the properties of the adhesives and/or to extend shelf life. Common commercial names include Super Glue, Crazy Glue, Insta Glue, Stick Fast and others. These adhesives have broad industrial, hobby, medical, veterinary and household applications. I will confine this article to a discussion of safety issues in working with CA adhesives, CA glue accelerators, CA glue de-bonders and their applications in woodturning.

SAFETY

I am starting this discussion about CA glue with safety because there are significant safety issues in working with this family of adhesives. CA glue is classified as non-toxic or low-toxicity by many manufacturers because a “cured” product is inert, but **DO NOT BE MISLED!** Liquid CA glue is nasty stuff and care must be taken when working with it! That said, I believe that cyanoacrylate glue is safe to work with when appropriate safety measures are **ALWAYS** followed.

- Always read the safety and caution information that comes with the products that you are using.
- Always store in closed containers and keep safely away from children.
- CA glues, CA glue activators and CA glue de-bonders are flammable and releases toxic fumes when burned.
- Do not smoke when using any of these products and keep them away from an open flame.

EYE PROTECTION

ALWAYS use eye protection when working with CA glue! Full face shields are recommended. CA adhesives are severely irritating to the eye. CA glue is water activated and bonds instantly to eye glasses, eyes and contact lenses. CA glue fumes are irritating to the eyes. **DO NOT HEAT** CA glue as this increases the toxic fumes. Always work with CA glue in a well-ventilated area so that the fumes are blown or sucked away from people.

Avoid “Pen Turner’s Glasses.” Most eye glass lenses are made of plastic, CA glue will bond to these lenses and **CANNOT** be removed (ask me how I know). Eye glasses are expensive. **ALWAYS** wear a face shield to protect your eyes and eye glasses when working with CA glue.

VAPORS

CA glue vapors are **irritating to mucous membranes and to the lungs**. CA glue vapors can trigger severe asthma attacks and difficulty breathing. About 5% of the population can become sensitized to CA adhesive fumes after repeat exposure and develop flu-like symptoms. **DO NOT** breathe CA glue fumes! **ALWAYS** use CA glue in a well-ventilated area and limit your exposure to the fumes as much as you can. Use a fan to blow the CA glue fumes away from yourself, other people and animals, or use a vacuum system to suck fumes away. This is especially useful when applying CA glue finish to pens and small objects.

SKIN REACTIONS

CA adhesives are irritating to the skin and **may cause allergic skin conditions**. It is best to avoid contact with your skin. With careful use, it is possible to minimize contact with the skin.

CA Glue and Heat Production

Be aware that CA glue reactions are **exothermic** (heat generating). Some CA glue reactions generate enough heat to cause significant burns and a few can even cause fires. These exothermic reactions also release tissue irritating fumes.

CA glue reacts with cotton and some natural materials such as leather and wool in a rapid and very strong exothermic way that may produce serious burns and fire. The CA glue reaction with cotton products may generate enough heat to cause burns, release toxic fumes and ignite into flames. **DO NOT** wear cotton or wool

clothing, and especially do not wear cotton gloves when working with CA glue. Test paper towels before using them with CA glue. Place a drop of CA glue on the paper towel and observe the reaction. If the paper towel smokes do not use it with CA glue. Try another brand.

CA GLUE ACCELERATORS

Accelerators are used to speed up the bonding and curing process of these already fast acting adhesives. Acetone and other chemicals are used in commercially available accelerators. All CA glue accelerators are **highly flammable** and **irritating to the skin, eyes and respiratory system**. They may cause systemic **toxicity** when adsorbed through the skin or respiratory system. These systemic effects may include dizziness, drowsiness, loss of consciousness and damage to lungs, liver and kidneys.

ALWAYS use CA glue accelerators in well-ventilated areas. **DO NOT** breathe the fumes and avoid contact with the skin.

CA GLUE DE-BONDERS

De-bonders dissolve cured and un-cured CA glue. Acetone is the classic de-bonder, but other chemicals may be present in commercial de-bonders. All CA glue de-bonders are highly flammable and are irritating to the skin, eyes and respiratory system and may cause systemic toxicity when absorbed through the skin or inhaled. These systemic effects may include dizziness, drowsiness, loss of consciousness and damage to lungs, liver and kidneys.

De-bonders may be used to remove CA glue from skin, but remember that de-bonders are toxic to humans and are absorbed through the skin. It is best to use appropriate caution when working with CA glue and not get it on your skin!

ALWAYS use CA glue de-bonders in well-ventilated areas. **DO NOT** breathe the fumes and avoid contact with the skin. If used on your skin, wash the area immediately after successful separation.

CA Adhesives Application in Woodturning

Ok, finally it's time to discuss some of the many ways that cyanoacrylate adhesives may be used in wood turning.

Shelf Life

CA glue has a short shelf life. For this reason we order relatively small amounts frequently, in order to assure fresh product for club members. When stored **unopened** in a refrigerator, CA glue will last for about two years. Because CA glue is very moisture sensitive, it is recommended that the glue be allowed to come up to room temperature before the container is opened in order to avoid moisture from condensation.

If the CA glue will be used within six months it may be kept at room temperature in the shop.

Sealed, unopened CA glue may be stored in a freezer indefinitely. Allow the CA glue to come to room temperature before opening.

DO NOT refreeze after thawing because condensed moisture will ruin the glue.

Viscosity & Set-up Time

Viscosity refers to the thickness of CA glue. CA adhesives set quickly. As a general rule, the thinner the CA glue the faster it sets. Said another way, the thinner the CA glue the shorter the working time to align the pieces being glued. Conversely, the thicker the CA glue the slower it sets and the longer the work time. For example, when gluing pen tubes into blanks, thin CA glue would be a poor choice because it will usually set up before the tube is in position in the blank. Thick or gel viscosity CA glues have long enough set times to permit proper alignment of parts.

Gap Filling Properties

CA glues have poor gap filling properties. However, CA glues may be mixed with sawdust, shavings, powdered stone, metal filings, etc. to fill gaps.

Wicking

Wicking or capillary action is the ability of a liquid to flow, unaided, into narrow spaces. For example, woodturners want good wicking ability to flow CA glue into cracks. Thin CA glues wick very well, while thick and gel CA glues wick little or not at all.

Bond Characteristics

CA adhesives produce very strong bonds. There are however, some limitations.

As opposed to many other adhesives, a very thin layer of CA glue is more effective than a thick layer.

While CA glue produces very strong bonds, it has relatively poor shear strength. This means that a lateral (from the side) force can break the bond. This property is useful in woodturning as work pieces can be glued to glue blocks and removed relatively easily with lateral force. Most CA glues form very brittle bonds. This can lead to joint failure, especially when lateral force is applied.

Flexible (rubberized) CA glues are available. These formulations reduce brittleness and improve shear strength.

Heat Resistance

CA glues are not high heat resistant. CA glue will “melt” on exposure to heat at levels that may be generated from sanding and polishing operations.

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