

# Turpentine Varnish

## Warning

This activity involves several safety hazards. Please carefully review the section below on “Safety Considerations” before undertaking any experiments following this protocol. The Making and Knowing Project is not liable for any injury or damage incurred by those who use this assignment sheet.

## Background

### Varnish

Any transparent protective or decorative coating. Varnishes are composed of a resin dissolved in a liquid which dries to form a hard glassy film (<http://cameo.mfa.org/wiki/Varnish>).

Varnishes fall into two categories:

- **Oil-based varnishes:** Resin dissolved in oil, such as linseed or nut oil
- **Spirit-based varnishes:** Resin dissolved in solvents or spirits, such as alcohol or volatile oils

### Turpentine

Turpentine is a term applied, often without adequate precision, to describe the first two of these three closely related materials:

- The sticky sap or oleoresin exuded from coniferous trees, especially from different genera of the Pinaceae family. This sap is also known as balsam, turpentine gum, or gum thus, though it is sometimes simply referred to as turpentine, particularly in historical sources.
- The volatile oil produced by distilling this sap. This product is also known as turpentine oil, oil of turpentine, spirits of turpentine, or turps, though it is sometimes simply referred to as turpentine, particularly in modern and industrial contexts where it is often used and marketed as a paint thinner.
- The solid, resinous residue that remains after distilling this same sap. This product is also known as rosin, colophony, or Greek pitch. Such residues sometimes constitute the resins in varnish recipes.

### Venice Turpentine

- An oleoresin that typically contains added colophony. As a result, it is much thicker than the pure balsam exuded from the tree.

For more information on varnishes, turpentine, turpentine derivative, and terminology, see Naomi Rosenkranz and Tianna Helena Uchacz, "Varnishes in the Rain," in *Secrets of Craft and Nature in Renaissance France. A Digital Critical Edition and English Translation of BnF Ms. Fr. 640*, Making and Knowing Project et al, (New York: Making and Knowing Project, 2020), [https://edition640.makingandknowing.org/#/essays/ann\\_517\\_ad\\_20](https://edition640.makingandknowing.org/#/essays/ann_517_ad_20).

The protocol below is adapted from instructions in Ms. Fr. 640.

## Historical Recipe for a Spirit-based Varnish

BnF Ms. Fr. 640, [fol. 3r](#)

### **Varnish for panels**

*Take a lb of Venice turpentine & heat it in a pot until it simmers, and put in half a lb of the turpentine oil of the whitest you can find, and stir it together well on a charcoal fire and take it off immediately. And ~~e~~ it is done. But if it seems too thick to you, add in a little more oil. Similarly if it is too clear, you can thicken it by putting in a little turpentine. Thus you will give it whatever body you want. It could be made well without fire, but, when heated, it is more desiccative. It is appropriate for panel paintings and other painted things without corrupting the colors or yellowing. And it dries both in the shade and in the sun, and overnight, and during the winter as well as in the summer. It is commonly sold 15 sous a lb.*

Translation take from *Secrets of Craft and Nature in Renaissance France*, <https://edition640.makingandknowing.org/#/folios/3r/f/3r/tl>.

## Modernized Recipe

### **Rationale**

- 16 oz (1 lb) of Venice turpentine
- 8 oz (½ lb) of Turpentine oil

→ 2:1 ratio resin to spirits

### **Ingredients**

- 40 g turpentine oil
- 20 g Venice turpentine

### **Equipment**

- Hotplate
- Scale
- Weighboat
- Thermometer

- 250 ml glass beaker
- Stirring utensil
- Glass vials with lids (to store the varnish)
- Beaker tongs or heat-resistant gloves/mitts
- Silicone trivet or potholder
- Optional: bowl of playground sand

### Process

- Weigh out the turpentine oil into weighboat or container and set aside
- Weigh out the venice turpentine into the 250 ml glass beaker
- Place hotplate inside fume hood
- Set beaker with venice turpentine on hotplate and heat gently so it liquifies (which occurs at ~100 °C) until it simmers (~120 °C)
  - Caution: the flash point of venice turpentine is somewhere around 40-60 °C (depending on the preparation and the manufacturer). Keep open flames away from the heating spike lavender oil, as there is risk that it might ignite at temperatures of 40 °C and above
  - Do not bring to a boil or to a temperature above 150 °C
  - Start with low settings on the hotplate
  - Monitor temperature with the thermometer and watch the solution carefully as it heats. You are looking for steam/vaporization and the formation of tiny bubbles that indicate a simmer (but not a boil)
- Once simmering, remove the beaker from the hotplate and place in bowl of sand or on a heat trivet. Do not place directly on a cold surface to prevent heat shock to glass
- Add the turpentine oil to the hot venice turpentine and stir until homogenous
- Pour varnish into glass vials and allow to cool before capping for storage

### Safety Considerations

- Personal protection: Always wear appropriate personal protective equipment, including safety glasses/goggles, lab coat or similar, long pants or skirt, closed-toed shoes. Tie back hair and avoid wearing jewelry, scarves, or other dangling/loose items.
- Fire and burns: The preparation of this varnish recipe requires the heating of a volatile oil and an oleoresin. There is a risk that these materials may ignite suddenly.
- Fire and burns: Hotplates must be used carefully.
- Fire safety: An ABC fire extinguisher and/or a fire blanket should be close at hand.
- Fumes: Volatile oils and oleoresins should only be heated with appropriate ventilation, such as in a laboratory fume hood or outside.
- Flammable materials: Turpentine oil and its resulting varnish are flammable materials. Keep away from heat sources and store with care.
- Glass shattering: Even tempered pyrex beakers may shatter or explode when heated. Moreover, heat shock increases this risk. Do not place a hot beaker directly on a cold surface and vice versa. Always use an insulating material such as a heat trivet or sand.

- Check that your plans comply with safety and environmental regulations in your jurisdiction, institution, or community.

## Material Safety Data Sheet Information Excerpts

- Turpentine oil
  - Flash point = 30–40 °C (Chemwatch)
  - Boiling range = 154–170 °C (Chemwatch)
- Venice turpentine
  - Flash point = 50–59 °C (Kremer SDS); 46 °C (Dipentene SDS - CAS 7705-14-8)
  - Boiling range = 178 °C (Dipentene SDS - CAS 7705-14-8)

## Fieldnotes

Making and Knowing Fieldnotes with step-by-step pictures and notes about the production of this and several similar varnishes can be consulted here:

[https://fieldnotes.makingandknowing.org/pre-2018-Fall/sp18\\_rosenkranz-uchacz\\_naomi-tianna\\_varnishes-in-the-rain/sp18\\_rosenkranz-uchacz\\_naomi-tianna\\_varnishes-rain-2/sp18\\_rosenkranz-uchacz\\_naomi-tianna\\_varnishes-rain-2-varnish-making-application.html#h.w4fnrsg2bdnc](https://fieldnotes.makingandknowing.org/pre-2018-Fall/sp18_rosenkranz-uchacz_naomi-tianna_varnishes-in-the-rain/sp18_rosenkranz-uchacz_naomi-tianna_varnishes-rain-2/sp18_rosenkranz-uchacz_naomi-tianna_varnishes-rain-2-varnish-making-application.html#h.w4fnrsg2bdnc).