

TEMPERA PAINTING

Tempera painting has been found on [early Egyptian sarcophagus](#) decorations. Many of the [Fayum mummy portraits](#) use tempera, sometimes in combination with [encaustic painting](#) with melted wax, the alternative painting technique in the ancient world. It was also used for the murals of the 3rd century [Dura-Europos synagogue](#).

A related technique has been used also in ancient and early medieval paintings found in several caves and rock-cut temples of India.^[2] High-quality art with the help of tempera was created in [Bagh Caves](#) between the late 4th and 10th centuries and in the 7th century in Ravan Chhaya rock shelter, Odisha.^[3]

The [art technique](#) was known from the classical world, where it appears to have taken over from [encaustic painting](#)^[citation needed] and was the main medium used for [panel painting](#) and [illuminated manuscripts](#) in the [Byzantine](#) world and [Medieval](#) and [Early Renaissance](#) Europe. Tempera painting was the primary panel painting medium for nearly every painter in the European Medieval and Early renaissance period up to 1500. For example, most surviving panel paintings attributed to [Michelangelo](#) are executed in egg tempera, an exception being his [Doni Tondo](#) which uses both tempera and oil paint.

[Oil paint](#), which may have originated in [Afghanistan](#) between the 5th and 9th centuries^[4] and migrated westward in the Middle Ages^[5] eventually superseded tempera. Oil replaced tempera as the principal medium used for creating artwork during the 15th century in [Early Netherlandish painting](#) in northern Europe. Around 1500, oil paint replaced tempera in Italy. In the 19th and 20th centuries, there were intermittent revivals of tempera technique in Western art, among the [Pre-Raphaelites](#), [Social Realists](#), and others. Tempera painting continues to be used in Greece and Russia where it is the traditional medium for [Orthodox icons](#).

Technique

Tempera is traditionally created by hand-grinding dry powdered [pigments](#) into a [binding agent](#) or *medium*, such as egg yolk, milk (in the form of [casein](#)) and a variety of plant gums.

Egg tempera

The most common form of classical tempera painting is "egg tempera". For this form most often only the contents of the [egg yolk](#) is used. The [white of the egg](#) and the membrane of the yolk are discarded (the membrane of the yolk is dangled over a receptacle and punctured to drain off the liquid inside). Egg yolk is rarely used by itself with pigment; it dries almost immediately and can crack when it is dry. Some agent is always added, in variable proportions. One recipe calls for vinegar, but only in small amounts. A few drops of vinegar will preserve the solution for a week. (1:3, 3 parts water, 1 part yolk; other recipes suggest white wine (1 part yolk, 2 parts wine). Some schools of egg tempera use various mixtures of egg yolk and water.

Powdered pigment, or pigment that has been ground in distilled water, is placed onto a palette or bowl and mixed with a roughly equal volume of the binder.^[6] Some pigments require slightly more binder, some require less.

When used to paint icons on church walls, liquid [myrrh](#) is sometimes added to the mixture to give the paint a pleasing odor, particularly as worshippers may find the egg tempera somewhat pungent for quite some time after completion. The paint mixture has to be constantly adjusted to maintain a balance between a "greasy" and "watery" consistency by adjusting the amount of water and yolk. As tempera dries, the artist will add more water to preserve the consistency and to balance the thickening of the yolk on contact with air. Once prepared, the paint cannot be stored. Egg tempera is water-resistant, but not waterproof. Different preparations use the egg white or the whole egg for a different effect. Other additives such as oil and [wax emulsions](#) can modify the medium. Egg tempera is not a flexible paint and requires stiff boards; painting on [canvas](#) will cause cracks to form and chips of paint to fall off.

Tempera grassa

Adding oil in no more than a 1:1 ratio with the egg yolk by volume produces a water-soluble medium with many of the color effects of oil paint, although it cannot be painted thickly.

Pigments^[edit]

Some of the pigments used by medieval painters, such as [cinnabar](#) (contains mercury), [orpiment](#) (contains arsenic), or [lead white](#) (contains lead) are highly toxic. Most artists today use modern synthetic pigments, which are less toxic but have similar [color](#) properties to the older pigments. Even so, many (if not most) modern pigments are still dangerous unless certain precautions are taken; these include keeping pigments wet in storage to avoid breathing their dust.

Application^[edit]

Tempera paint dries rapidly. It is normally applied in thin, semi-opaque or transparent layers. Tempera painting allows for great precision when used with traditional techniques that require the application of numerous small brush strokes applied in a [cross-hatching](#) technique. When dry, it produces a smooth [matte](#) finish. Because it cannot be applied in thick layers as oil paints can, tempera paintings rarely have the deep color [saturation](#) that oil paintings can achieve because it can hold less pigment (lower pigment load). In this respect, the colors of an unvarnished tempera painting resemble a [pastel](#), although the color deepens if a [varnish](#) is applied. On the other hand, tempera colors do not change over time,^[7] whereas oil paints darken, yellow, and become transparent with age.^[8]

Ground

Tempera adheres best to an absorbent ground that has a lower oil content than the tempera binder used (the traditional rule of thumb is "*fat over lean*", and never the other way around).^{[9][10]} The ground traditionally used is inflexible Italian [gesso](#), and the substrate is usually rigid as well.^[11] Historically wood panels were used as the substrate, and more recently untempered [masonite](#) or [medium density fiberboard](#) (MDF) have been employed; heavy paper is also used.

Pre-made paints

Apart from the traditional process of mixing pigment with egg yolk, new methods include egg tempera sold in tubes by manufacturers such as Sennelier and Daler-Rowney. These paints do contain a slight amount of oil to enhance durability within the container. [Marc Chagall](#) used Sennelier egg tempera tube paints extensively.

Artists

Although tempera has been out of favor since the Late Renaissance and [Baroque](#) eras, it has been periodically rediscovered by later artists such as [William Blake](#), the [Nazarenes](#), the [Pre-Raphaelites](#), and [Joseph Southall](#). The 20th century saw a significant revival of tempera. European painters who worked with tempera include [Giorgio de Chirico](#), [Otto Dix](#), [Eliot Hodgkin](#), [Pyke Koch](#),^[12] and [Pietro Annigoni](#), who used an emulsion of egg yolks, stand oil and varnish.

Spanish surrealist painter [Remedios Varo](#) worked extensively in egg tempera.