

The Art of Alchemy

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What is alchemy? Long shrouded in secrecy, alchemy is now recognized as the ancestor of modern chemistry. Alchemists were notorious for attempting to make synthetic gold, but their goals were far more ambitious: to transform and bend nature to the will of an industrious human imagination. For scientists, philosophers, and artists alike, alchemy seemed to hold the key to unlocking the secrets of creation.

Alchemists' efforts to discover the way the world is made have had an enduring impact on artistic practice and expression around the globe. Inventions born from alchemical laboratories include metal alloys for sculpture and ornament, oil paints, effects in glassmaking, and even the chemical baths of photography. The mysterious art of alchemy transformed visual culture from antiquity to the Industrial Age, and its legacy still permeates the world we make today.

—David Brafman, Associate Curator of Rare Books, Getty Research Institute

TOP: Title woodcut. From Philipus Ulstadus, *Coelum philosophorum seu de secretis naturae liber* (Strasbourg, 1528), title page. Los Angeles, Getty Research Institute, 1380-904.

RIGHT: Allegory of distillation, watercolor. From Claudio de Domenico Celentano di Valle Nove, [Book of Alchemical Formulas] (Naples, 1606), p. 6. Los Angeles, Getty Research Institute, 950053.

FRONT COVER: Hermes Trismegistos teaching the geometry of creation, watercolor. From Michael Maier, "Atalanta Fugiens," trans. anonymous, France, ca. 1687, p. 41. Los Angeles, Getty Research Institute, 950053.



♁ Alchemical Symbols and Terms ♁



Alchemy employed a systematic set of symbols and technical terms, commonly recognized by laboratory technicians and natural philosophers alike, to indicate and record scientific operations, formulas, and ingredients. Here is a sampling of standard alchemical visual and verbal vocabulary:

THE SEVEN PLANETARY METALS

☉	Sun	Gold
☾	Moon	Silver
☿	Mercury	Quicksilver
♀	Venus	Copper
♂	Mars	Iron
♃	Jupiter	Tin
♄	Saturn	Lead

The seven planets known in antiquity were linked to the seven metals that had been identified in prehistory. The association between these heavenly bodies and earthly metals is attested in Alexandria in the fourth century, although hints of belief in such cosmic correspondence can be traced back to Babylonian astronomers of the eighth century BCE.

Mercury, “The Hypocritical Planet” (so-called, as it appeared golden near the sun and silvery near the moon), watercolor. From Zakariya ibn Muhammad al-Qazwini, “Kitāb al-‘ajā‘ib wa’l-gharā‘ib” (Book of Wonders and Oddities), Istanbul, 1553, p. 29. Los Angeles, Getty Research Institute, 2010.M.65. Gift of Lawrence J. Schoenberg.



Alchemical Processes and Laboratory Ingredients

The order and names of the stages of alchemical process often vary from source to source, and, likely, from place to place as well. Twelve became the standardized number of stages, which were associated with the signs of the zodiac, perhaps because celestial motion provided an accurate method for measuring time.

PROCESS	ZODIACAL SIGN	DEFINITION
Calcination	♈ Aries	Drying to a chalky or powdery state
Congelation	♉ Taurus	Thickening, gelatinizing
Fixation	♊ Gemini	Stopping the progress of a chemical reaction at the proper time
Dissolution	♋ Cancer	Creating a liquid solution by dissolving a substance
Digestion	♌ Leo	Gently heating a substance slowly over time (up to several weeks) in a sealed container
Distillation	♍ Virgo	Purifying a liquid by heating it until it evaporates, then cooling to the point of condensation
Sublimation	♎ Libra	A solid becoming a gas without liquefying
Separation	♏ Scorpio	Isolating constituent components of a compound, usually by means of filtration
Ceration	♐ Sagittarius	Softening to a waxy consistency
Fermentation	♑ Capricorn	Converting organic matter into new compounds via a two-part process of decay and “resurrection”
Multiplication	♒ Aquarius	Increasing the potency of a substance
Projection	♓ Pisces	The ultimate alchemical goal: transmuting base matter into a more noble form, such as lead into gold or silver





COMMON LABORATORY INGREDIENTS

⊖	Alum	♁	Mercury
♁	Antimony	⊖	Oil
♃	Aqua vitae (Water of life)	♃	Quicklime
♁	Arsenic	♁	Realgar
♁	Auripigmentum (Orpiment)	♁	Sal ammoniac (Ammonium chloride)
♁	Bismuth ore	♁	Sal gemmae (Rock-crystal salt)
♁	Borax	♁	Silver
♁	Calx (Chalk)	♁	Soap
♁	Cinnabar (Mercury sulfide)	♁	Sulfur
♁	Gold	♁	Urine
♁	Horse dung	⊕	Verdigris
♁	Lodestone	♁	Wax



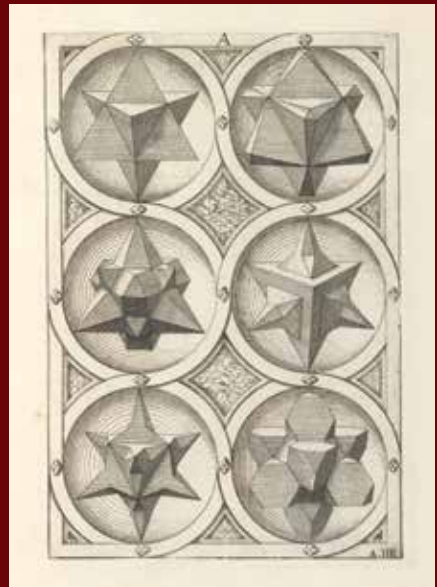
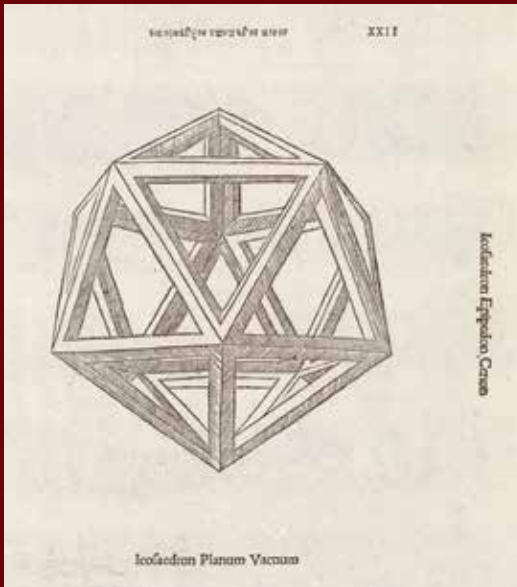
Extracting the essence of colors (detail), watercolor.
From the Ripley Scroll, England, ca. 1700. Los Angeles, Getty Research Institute, 950053.

The Elements

Element	Symbol	“Atomic” Shape
Earth	▽	
Water	▽	
Air	△	
Fire	△	

In the fifth century BCE, the Sicilian-Greek philosopher Empedocles proposed that all physical matter was composed of four elements. Democritus of Abdera then theorized that these elements were made up of indivisible particles called *atoms* (*atomos* means

“uncut” in Greek). During the next century, Plato and Aristotle assigned these atoms geometric forms and asserted the existence of a fifth ethereal element of which the heavens were composed.



ABOVE LEFT: Leonardo da Vinci (Italian, 1452–1519). *Hollow Icosahedron* (Water Atom), woodcut. From Luca Pacioli, *Divina proportione* (Venice, 1509), fol. 22. Los Angeles, Getty Research Institute, 84-B9582.

ABOVE RIGHT: Jost Amman (Swiss, 1539–1591), after Wenzel Jamnitzer (German, 1507/8–1585). Designs for clusters of fire atoms, engraving. From Wenzel Jamnitzer, *Perspectiva corporum regularium* (Nuremberg, 1568), fol. 7. Los Angeles, Getty Research Institute, 2002.PR.39.

A Glossary of Common Alchemical Terms

ALCHYMIA (OR CHYMIA)—Alchemy. The Latin word *alchymia* is derived from the Arabic *al-kimia*, which is a transliteration of the Greek *chêmeia* (metal pouring). The root of the word might be traced to the Egyptian *chem* (☐), meaning “black,” referring to the mineral-rich dark soil along the banks of the Nile. *Chem* was also the Egyptians’ own word for *Egypt*.

ALEMBIC ☿ —A distilling apparatus consisting of two vessels connected by a cap with a long beak. In use since antiquity, it was often used for isolating purified mercury. When the capped vessel was heated, the quicksilver vapors rose to the cap and were channeled through the beak. The gaseous vapors cooled as they traveled through the beak, and condensed into a liquid. The precipitation settled at the bottom of the receiver vessel, where the contents were collected. The modern version of the alembic is the pot still, used for distilling alcoholic spirits (fig. 1).

AMALGAM—An alloy of mercury and another metal. Mercury can bond with almost any metal.

CRUCIBLE—An open pot or beaker, usually made of iron or ceramic, that could withstand high heat or radical changes in temperature. It was common laboratory practice to place ingredients at the bottom and then seal the crucible by packing it with animal dung. Heating the pot created a variety of reactions caused by the effects of the decomposing feces and gaseous emissions.



Fig. 1. Thomas Cross (British, active 1645–1685). *The Curious Distillatory*, engraving. From Johann Elsholtz, *The Curious Distillatory* (London, 1677), frontispiece. Los Angeles, Getty Research Institute, 85-B8467.

Glossary, continued

ELIXIR—A potion capable of curing any and all medical ills. It could also potentially grant immortality. An alternative form of the word found in alchemical texts is *liquor*. The word *elixir* is a transliteration of the Arabic *al-iksir*, itself derived from the Greek word *xerion*, a white, powdery form of sulfur applied to war wounds in antiquity. Sulfa powder, used for the emergency treatment of wounds on the battlefield, was standard issue in every GI's field kit through World War I.

GREEN DRAGON—The image usually symbolizes sulfuric acid, but is also used generically to denote a corrosive agent or the action of breaking down chemical impurities (fig. 2).

VITRIOL—A sulfate usually produced by the chemical corrosion of metals. The word derives from the Latin *vitreolum* (glassy), as many metallic sulfate crystals resemble shards of glass. Vitriols were classified by colors such as blue, red, and green, and were often symbolized by dragons. They were systematized by the Iranian alchemist ar-Razi, and had numerous applications in the decorative arts.

WHITE BIRD—A common symbol of the purification process. As a figural scheme for mercury-amalgam gilding, a white bird (The Bird of Hermes) was shown diving into a greasy black pool at the base of a vessel, streaking it with gold (fig. 3).



Fig. 2. The Serpent of Arabia (or green dragon) in the process of purging physical impurities, watercolor. From the Ripley Scroll, England, ca. 1700. Los Angeles, Getty Research Institute, 950053.



Fig. 3. *Purgatio*, ink and watercolor. From "Das Buch mit Sieben Siegeln" (The Book with Seven Seals), ca. 1700. Los Angeles, Getty Research Institute, 950053.

