

The Chemistry of Paint



TWF SAMI

The Chemistry of Paint

History

Paint is any substance that when applied to a surface, becomes a solid film. The history of paint is extensive and color can even be traced back 20,000 years via cave paintings, much of which is still preserved today. The Egyptians considered color to have magical and healing powers and many examples have been discovered in Egyptian tombs. Between 600 B.C and 400 A.D., the Romans and Greeks introduced varnishes, which is one of the variations paint has taken over the years. Some of the earliest recipes for paint consisted of milk proteins while others included substances such as: olive oil, linseed oil, eggs, animal glue, or waxes. Durability of paint and its ability to resist the elements was extremely important; therefore, over time, paints began to be developed to withstand rain and wind.



How They Work

Paint is composed of pigments, binders, solvents or thinners, and additives. Pigments provide the color that we see in paints. The color comes from the fact that the pigment reflects and absorbs different wavelengths of light. Metal compounds are the traditional components that make up the pigment. Titanium dioxide makes the color white; iron oxide makes red, yellow, brown, or orange paint; chromium oxide creates green paint; and black paint gets its color from carbon elements. As you mix each of these different pigments together, you are able to form the spectrum of colors that we see today.



Binders are what hold the pigments together and allow the paint to stick to the surface you are painting on. Most binders are made from synthetic plastics that in chemistry are known as polymers (poly meaning many large molecules).

A solvent or thinner dissolves the pigment and binder so that it is easier to spread onto the surface; without it, the paint would be very thick and difficult to apply. The solvent then evaporates into the air giving paint that strong smell you sometimes get. Water is the most common solvent with others being comprised of organic petroleum compounds. These petroleum or oil-based paints are much less common these days due to their detrimental environmental effects. In addition to pigments, binders, and solvents, paints often include additives such as ceramic substances to make the paint stronger, fluorescents to

make them glow in the dark, and other substances to provide waterproofing, rust proofing, and protection against sunlight.

Current Applicability

Ecobottle Sample



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Controversy

One of the biggest controversies surrounding the chemistry of paint was the use of lead as an additive and pigment in early paint recipes. Lead exposure through dust and on toys and cribs has been associated with increased incidences of cancer. This is why it was banned in the United States in 1977 with the European Union following suit in 1989.

Environmental Impact

Although paint has many beneficial uses, it can also negatively affect the environment. Improper disposal can lead to toxins being released into water and soil, contaminating animal and plant habitats. Improper paint disposal can also have negative impacts on the health of certain wildlife. The most significant environmental impact is the release of volatile organic compounds (VOCs), which can be released into the atmosphere as paint dries. These chemicals result in the creation of ozone, which results in the formation of smog and the deterioration of the environment. This is why governments play a huge role in the regulation of paints and their VOC contents.

Reading Comprehension Questions:

1. What
2. How
3. How are different colors created?
4. What
5. What is the function(s) of solvents?
6. Why
7. What are distemper paints and why are they useful?
8. Why
9. What
10. Someone wants to know about the chemistry of paint. Summarize what you know about it in 100 words or less.

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