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Historical Background of Paint and Coatings

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The oldest evidence of painting was left by primitive peoples. Cave dwellers and hunters left paintings of the animals that they hunted. Paintings in caves have survived because of their protected locations. Most cave paintings used the colors black, red, and yellow. Chemical analysis of these early paintings has shown that the main pigments used were iron and manganese oxides. To form applicable paints, the pigments were possibly mixed with egg white, animal fats, plant sap, or water. The resulting mixture of binder-containing pigments could then be applied to cave walls.

During the period 3000–600 BC, many paint-making advances were made by the Egyptians. They not only developed pigments with a wider range of colors but are also credited with producing the first synthetic pigment (Egyptian Blue) and developing the first lake pigments. Preservative paints and varnishes were also used during this time.

Drying oils as part of varnishes were used during the period 600 BC–400 AD by the Greeks and Romans. In the tenth century AD, Theophilus describes a varnish made by heating amber resin with linseed oil. Varnish was used to protect painting on wood during the Middle Ages. Pigments were suspended in a varnish like the one described by Theophilus in order to make a more durable paint.

For hundreds of years, paint formulations were handed down from one generation to the next and were often carefully guarded. Paints were produced in small batches, with the procedure being a relatively expensive one and the product not affordable to many. However, the demand for paint and coatings became great enough that by the late eighteenth and early nineteenth century it became profitable to make paint for wider consumption.

The first paint and varnish factories were established during the nineteenth century. The industrial revolution and the mass production of the automobile strongly influenced the growth of the paint and coatings industry. The need for anti-corrosive coatings as well as other special-purpose coatings helped to accelerate the rate of scientific discovery. Titanium dioxide, the white pigment that would replace white lead, was introduced in 1918. After the middle of the twentieth century, the natural oils that had been used in paint formulations were replaced by synthetic resins. Today's coatings manufacturers offer a wide variety of products to protect, decorate, and perform special functions on the surfaces of products ranging from children's toys to spacecraft.

In the later part of the twentieth century, society's growing environmental awareness has presented a new challenge to the paint and coatings industry—to produce coating products that meet the demands of manufacturers and consumers and at the same time comply with the government environmental constraints. Certain chemicals have been shown to be toxic and hazardous to humans and/or their environment. Regulatory agencies are setting strict standards with which coatings manufacturers need to comply. This has led to a greater interest in developing coatings such as those

that use water instead of volatile organic compounds in their formulation and powdered coatings that are absolutely solvent-free.

References

- Paint and Surface Coatings: Theory and Practice*; R. Lambourne, Ed.; Ellis Horwood: Chichester, England, 1987.
- Reisch, M.S. "Paints & Coatings," *C&E News* 1995, 73 (39), 30–31, 48–52.