Coloring and Protecting our World with Paint

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Paint is everywhere in our world! It has been used in art for tens of thousands of years. Early paints were red, orange, yellow, black, and white. These colors came from natural pigments such as powdered minerals, clays, charcoal, and bone. These pigments were mixed with egg or animal fats to make pastes and paints that could be spread on surfaces. New paint colors were made from materials across the world. Cochineal insects from Mexico and Peru created pink and purple paints. The mineral lapis lazuli from Afghanistan was used to make deep blue paints. Since the 1700s, chemists have synthesized new molecules, such as Prussian blue, that have expanded our color palette.

The industrial revolution led to large-scale manufacturing of paint, and paint became cheaper and more widely available. Paint could now be used not only for art but for protection! Paints can form a thin barrier on surfaces to protect against water and oxygen. This helps prevent iron from rusting and wood from rotting. Buildings, cars, and machines now last longer as a result.

Today's paints may look the same ones used decades or centuries ago, but chemists have helped make them safer. Lead was widely used because it helped create more durable paints that dried faster. However, lead is toxic and can end up in dust and flakes that children can swallow. Lead is especially harmful to young children and their developing brain and nervous systems. Other toxic elements were used in paints, such as arsenic and chromium. New compounds and formulations were developed to replace these elements while maintaining the same appearance. One of the most widespread replacements for lead is titanium dioxide, which can also be found in many sunscreens!

Not only are the pigments in paint safer today, but so is the solvent used in the paint itself! Natural and synthetic oils replaced the egg and animal fats to disperse the pigments. The solvents in these oil-based paints give off flammable vapors referred to as volatile organic compounds. These vapors contribute to air pollution. Water-based latex and acrylic paints were developed in the mid-20th century to replace oil-based paints. They give off fewer vapors, can be cleaned with water, and even dry faster than oil-based paints. Even powder-based paints that contain no solvents have been invented. Chemists are continuing to improve paints to keep our world bright and colorful!

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