

U.S. Fire Administration / National Fire Academy

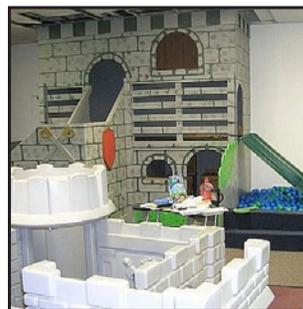
Coffee Break Training

Topic: Plastics (Part IV: Thermoset and Thermoplastic Polymers)

Learning Objective: The student shall be able to explain the difference between thermoset and thermoplastic polymers.

A thermoset is a polymer that solidifies or “sets” irreversibly when heated or cured. Imagine the difference between a raw and a cooked egg: A cooked egg cannot return to its original form once heated, and a thermoset polymer can’t be softened once it has “set.” Thermosets are strong and durable, and are used extensively in automobiles and construction, including applications such as adhesives, inks, and coatings. The most common thermoset is the rubber truck and automobile tire. Some examples of thermoset plastics and their product applications are

Polyurethanes	Unsaturated Polyesters	Epoxies	Phenol Formaldehyde
Mattresses Cushions Insulation	Boat hulls Bath tubs and shower stalls Furniture	Adhesive glues Coating for electrical devices Helicopter and jet engine blades	Oriented strand board Plywood Electrical appliances Electrical circuit boards and switches



A variety of thermoset plastics in a child care occupancy.

A thermoplastic is a polymer in which the molecules are held together by weak secondary bonding forces that soften when exposed to heat and return to their original condition when cooled back down to room temperature. Imagine an ice cube that can change from a solid to a liquid and back to a solid. Thermoplastics are commonly used in food packaging because they can be formed rapidly and economically into any shape needed to fulfill the packaging function. Examples include milk jugs and carbonated soft drink bottles. Other examples of thermoplastics are

Polyethylene	Polypropylene	Polyvinyl Chloride (PVC)
Electrical insulation Packaging Milk and water bottles Packaging film House wrap Agricultural film	Carpet fibers Automotive bumpers Microwave containers External prostheses	Electrical cable sheathing Floor and wall coverings Automobile instrument panels Exterior siding

You can obtain more information about plastics from the American Plastics Council at www.plastics-info.com

