

Synthetics in Athletics

from **Celebrating Chemistry**



About 50 years ago, bathing suits were made of cotton, and tennis racquets were built with wood. Not anymore. The work of chemists and other scientists have led to the use of new materials in sports equipment and clothing that have changed many sports. The materials are usually lighter and longer-lasting and help athletes move faster and feel more comfortable.

Many of the materials used in today's sports are made in laboratories by chemists. These materials are known as "synthetic". For example, the 2008 Olympic swimmers wore swimsuits made from nylon and spandex. Both of these materials are synthetic polymers; long fibers that chemists have designed to have special properties – nylon to be smooth and durable, and spandex to be stretchy. Compared with a cotton swimsuit, a nylon and spandex one is light, slippery, and fits tightly. It allows the swimmer to move and glide quickly through the water.

Today's tennis racquets are made of carbon

fiber and fiberglass, a combination of synthetic materials. The racquets weigh about half as much as early wooden racquets. Because they are lighter, the risk of injury decreases and a more powerful swing is produced.

Another common material used in sports equipment is found in nature: rubber. It is a natural polymer that comes from a tree. For example, rubber is the main ingredient in bicycle tires and basketballs. It is often mixed with other chemicals to make it stronger. In bicycle tires, carbon black is added to improve the traction of the tire's treads and to give it its traditional black color. The insides of most balls are made of rubber that is wrapped with layers of fibers. Other natural materials that are used are cotton and leather. Think about where you can find them in today's sports equipment.

As you explore the chemistry in sports equipment, look at the materials in your own activities. How do these materials compare to what your teachers or family members used when they were younger?

Now and Then

SPORT	SPORT ITEM	NOW	THEN
Soccer	Shin Guards	Injection-molded plastic	Extra socks or none
	Balls	Polyurethane	Leather
Football	Helmets	Polycarbonate with soft foam or air-filled cushioning	Leather
Gymnastics	Floor Mats	Several layers of protective plastics	Horsehair and straw
Volleyball	Knee Pads	Plastic foams	Nothing
Track & Field	Tracks	Plastic rubbers	Cinder and clay
	Pole-Vault	Plastic and fiberglass	Bamboo
	Hurdles	Plastic	Wood
Basketball	Backboards	Fiberglass	Wire mesh or wood
	Nets	Nylon	Metal chains
Baseball	Bats	Titanium, aluminum, and wood	Wood
Ice Hockey	Pucks	Rubber	Wood
Golf	Clubs	Titanium or other metals	Hickory
	Balls	Rubber-core, Titanium-core	Wood, Feather-stuffed leather