Why Do Leaves Change Color in the Autumn?

It would not feel like fall without the sight, smell, and oh-so-familiar crunch of fallen leaves. But why do some trees change colors this time of year? Here is the science and chemistry behind that festive fall foliage change.

The Splendor of Autumn

Every fall, we marvel in the beauty of the autumn colors. Trees provide a colorful show of reds, oranges, and yellows resulting from a chemical process in the tree as the seasons change from summer to winter.

During the spring and summer, the leaves act as factories making the necessary food for trees’ growth and survival. This food-making process takes place in the leaf in numerous cells containing chlorophyll, which gives the leaf its green color. This amazing chemical absorbs sunlight using the sun’s energy to transform carbon dioxide and water into carbohydrates, such as sugars and starch.

Chlorophyll contains green pigments as well as orange and yellow pigments. Most of the year, these colors are masked by the abundance of green coloring.

Chlorophyll Breaks Down

However, come autumn, because of changes in the length of daylight and temperature changes, the leaves stop their food-making process. The chlorophyll breaks down, the green color disappears, and the yellow to orange colors become visible.

Simultaneously, other chemical processes occur, which form additional colors through the development
of red anthocyanin pigments. Some mixtures give rise to the reddish and purplish fall colors of trees such as
dogwoods and sumacs, while others give the maples their brilliant orange hues.

The fall foliage of some trees shows only yellow colors. Others, like many oaks, display mostly browns. These
colors are due to the mixing of varying amounts of chlorophyll residue and other pigments in the leaf during the
fall season.

Other Changes Take Place
As fall colors appear, other changes begin to take place. When the stem of the leaf is attached to the tree, a
special layer of cells develops and gradually severs the tissues supporting the leaf. At the same time, the tree heals the cut so that when the leaf is finally blown off by the wind or falls from its own weight, it leaves behind a leaf scar on the branch or twig.

Most broad-leaved trees shed their leaves in the fall. However, the dead brown leaves of the oaks and a few other species may stay on through the winter until new growth starts again in the spring.

Only Some Trees Lose Leaves
Most of the conifers – pines, spruces, firs, hemlocks, cedars, etc. – are evergreen. The needle- or scale-like leaves remain green throughout the year. There are exceptions to this – European larch, tamarack larch, bald cypress, and dawn redwood trees are deciduous conifers losing their needles in the fall.

Weather Affects Color Intensity
Three factors influence the degree and duration of fall colors – temperature, length of sunlight, and abundance of water. The conditions that make for spectacular autumn color displays are a moist growing season followed by a dry autumn with warm, sunny days and cool nights.

So, get outside and enjoy the fall colors; they only last a short time.