

# Hydrophilicity of modern materials



## Key words

- Liquid
- Molecular structure
- Permeability
- Solid
- Temperature

## The science behind

### Introduction:

In the video we will find out which materials absorb water and which materials repel water.

Water forms bonds with polar molecules of substances. This enables them to absorb water or dissolve in water, which indicates the hydrophilicity of a substance.

In the contrary, if the particles of the substance do not form bonds with water, the substance repels water and does not soak or dissolve – it is hydrophobic.

A hydrophile is a molecule or other molecular entity that is attracted to water molecules and tends to be dissolved by water.

The particles in the cotton layer of a diaper are made up of a chemical called sodium acrylate. If you add water to these particles, a chemical reaction occurs. Particles make a sticky gel, which should not flow out of the cup.



Particles from diapers have a strong hygroscopicity - the ability to absorb and retain water. Some hygroscopic substances are capable of adsorbing and holding 50 times more water than they weigh. Diaper manufacturers add hygroscopic particles to their inner layer so that they retain moisture and the child remains dry

### **Explanation**

Material's hydrophilicity is a key factor in biodegradation as water is the universal solvent in biological systems. Hydrophilicity is determined by the polymer composition as well as its morphology and is a measure of how well the material absorbs water, swells from it, or dissolves in water.

### **Every day life**

Hygroscopicity and hydrophilicity can be found in everyday life, in such products and fields as physics, chemistry, engineering, biomedicine, drug delivery, foods, pharmaceuticals, paints, textiles, paper, construction, adhesives, coatings, water treatment, dispersing and suspending agents, stabilisers, thickeners, gellants, flocculants and coagulants, film-formers, humectants, binders and lubricants, personal care products, building materials, and hydrophilic polymers. Many of the cleaning products we use are also hydrophilic, such as bleaches. Hydrophilic molecules are molecules that can interact with water. The word hydrophilic literally means "water-loving."

Some of the **most common examples** of hydrophilic substances are **sugar, salt, starch, and cellulose**



### Examples of Hydrophilic Substances:

- Protein
- Keratin
- Wool
- Cotton
- Silica
- Gypsum
- Gelatin, agar, agarose, algin
- Alcohols
- Cyclodextrins
- Guar gum, xanthan gum
- Starch
- Pectin
- Dextran
- Carrageenan, et cetera

Absorbing substances in agriculture - substances absorbing excess water (hydrogel); in medicine (diapers, hygienic pads); in food production (gelatine).

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