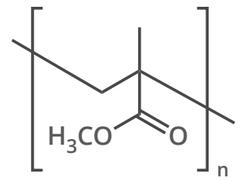
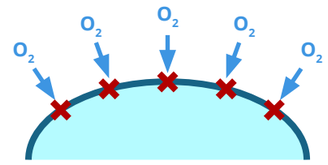
THE CHEMISTRY OF CONTACT LENSES

Simple though they may seem, there's some complex chemistry behind the contact lenses that many of us use on a daily basis. Here we take a look at some of the different chemicals that have been used over the years, and how contact lenses have gradually evolved.

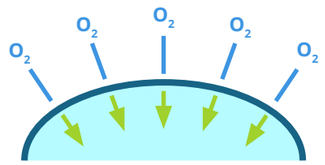
RIGID CONTACT LENSES



PMMA
first rigid polymer lens



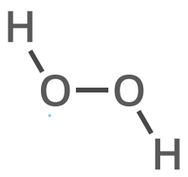
HARD LENSES
impermeable to oxygen



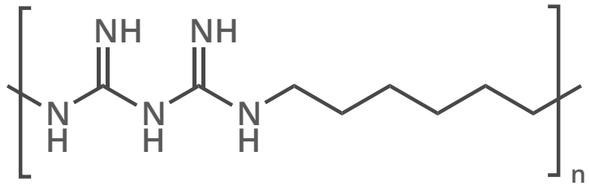
RIGID GAS PERMEABLE
permeable to oxygen

Rigid contact lenses, made from poly(methyl methacrylate) (PMMA), were the first available. Prior to this, glass lenses had to be used. PMMA lenses weren't very oxygen-permeable, so improved rigid materials which were were developed. These more modern rigid lenses contain silicone and/or fluorine-containing compounds.

CONTACT LENS SOLUTION



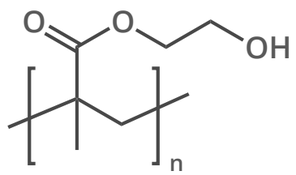
HYDROGEN PEROXIDE
peroxide solutions



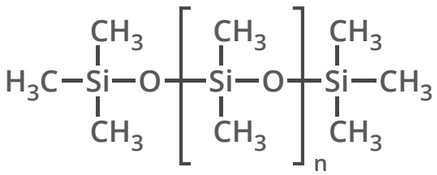
POLYHEXAMETHYLENE BIGUANIDE
multipurpose solutions

Cleaning solutions are either peroxide or multi-purpose solutions. Peroxide solution uses peroxide to disinfect; multi-purpose solutions use polymeric cleaning agents such as biguanides or polyquaterniums. Both contain other cleaner & moisturising chemicals.

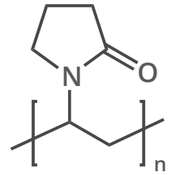
SOFT CONTACT LENSES



PHEMA
first soft polymer lens



POLYDIMETHYLSILOXANE (PDMS)
used in elastic soft lenses



POLYVINYLPYRROLIDONE
common hydrophilic co-polymer

Soft contact lenses are the most commonly used. These are based on hydyrogels, the first of which was poly(hydroxyethyl methacrylate) (PHEMA). Hydrogels are networks of cross-linked polymer chains that are highly water-absorbent. More recently, siloxane-containing hydrogels which are more oxygen-permeable have been developed.