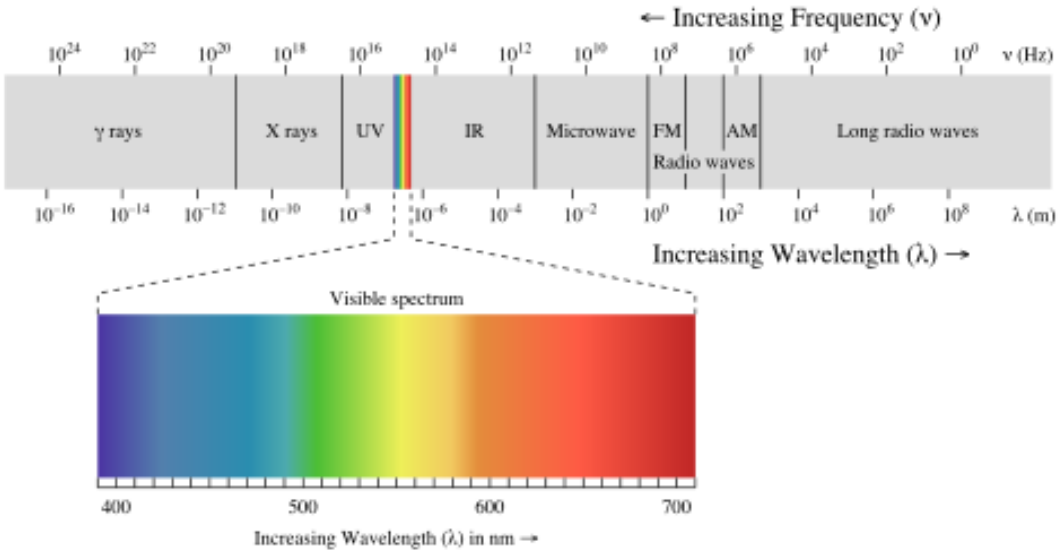
Seeing Colours

This brief article is not strictly speaking about glass as a medium but about how we see colours. Visible light is a form of energy, cosmic or solar energy if you like, and the wavelengths of the various colours of visible light are shown below.

Colour	Wavelength Interval	Frequency Interval
red	~ 625–740 nm	~ 480–405 THz
orange	~ 590–625 nm	~ 510–480 THz
yellow	~ 565–590 nm	~ 530–510 THz
green	~ 500–565 nm	~ 600–530 THz
cyan	~ 485–500 nm	~ 620–600 THz
blue	~ 440–485 nm	~ 680–620 THz
violet	~ 380–440 nm	~ 790–680 THz

Science warning!! The Electromagnetic Spectrum



When light strikes an object, it can be absorbed, reflected, or scattered. When the surface absorbs all wavelengths equally, we perceive it as black. When the surface reflects all wavelengths equally, we perceive it as white.

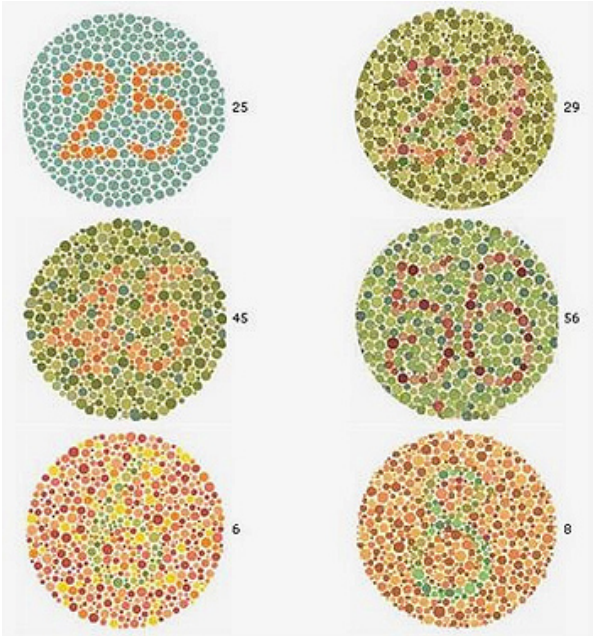
Colour is often mistaken as a property of light when it really is a property of the brain. Our experience of colour depends not only on the wavelength of the light rays that hit the retina, but also the context in which we perceive it- things such as background colours, lighting, familiarity, and surroundings.

Within the retina are buried receptor cells called rods and cones. When light energy strikes them, neural signals are created as a result of chemical changes. The signals are then routed through neighbouring bipolar and ganglion cells that form the optic nerve. This nerve then transmits information to the brain's visual cortex. Our 120 million rods are responsible for our perception of black, white, and grey. They are the most sensitive in dim light. Our 6 million cones, on the other hand, are what enable us to see colour and fine detail. They function in well-lit conditions and become ineffective with diminished illumination.

There are three primary colours- red, blue, and green- that make the millions of colours that are distinguishable by the "normal" human eye. Each eye contains three receptors (one for each primary colour) that generate the experience of colour when stimulated in various combinations. This is known as the Young-Helmholtz Trichromatic Theory. Those who have defective cones have difficulty seeing certain colours and are known to be colour-deficient. With this in mind, it is fair to then say that the number of colours the human eye can discriminate depends mainly on the sensitivity of the individual's eyes.

People who are colour blind can't see some colours or see them differently from other people. Colour blindness is inherited, affecting more boys than girls. Out of 20 boys, it is likely that one or two will have a colour vision problem.

The term 'colour blindness' is misleading. People who can't see all colours can still see things (other than colour) as clearly as people who are not colour blind. Very few people who are colour blind are blind to all colours. The usual colours that people have difficulty with are greens, yellows, oranges and reds.



Colour Blindness test discs - have a look and freak yourselves out!!