

Colour and light

More Details

From colourful to black: the subtractive colour mixing

The world is colourful

Lean back for a moment and look around: How many different colours can you discover? Which colours do you particularly notice?

The world around us is colourful. We have become so accustomed to them that we rarely notice the colours – for example, when we look at things in a different light or when objects like the proverbial “pink elephant” have a special or unusual colour. But where do things get their colour from? Why is the sky blue and the ladybird red? What is colour anyway?

Light colours and object colours

Colours are not just there. They are a sensory perception that only comes about through the interaction of light, our eyes and the brain. A basic distinction is made between light colours and object colours. Light colours are colours emitted by light. You can explore them in the experiment “Coloured Shadows”. Object colours, on the other hand, are based on the properties of material objects. A car is red and grass is green, because they absorb certain parts of sunlight and reflect others, depending on their specific nature. Grass absorbs the red and blue areas of light and reflects the green ones. So the object colours we see

are basically coloured light that has previously taken the diversion via the surface of an object.

This kind of colour formation is also called “subtractive”, because certain wavelengths are taken from white sunlight (i.e. subtracted). If different object colours are mixed, e.g. when you paint a picture with drawing ink, each of the colours that are used absorbs a certain proportion of the light. The result: the more colours mix, the darker the colour becomes – until at some point all colour components have been filtered out of the light and the picture appears black to us.

Printing with CMYK

Printers also work according to the principle of “subtractive colour mixing”. From the three basic colours cyan, magenta and yellow, they mix every colour imaginable (Fig. 1). All colours together make black. To avoid having to mix up pure black areas from three expensive basic colours, printer cartridges always have an additional black colour (key; a technical term from the printer language for black).

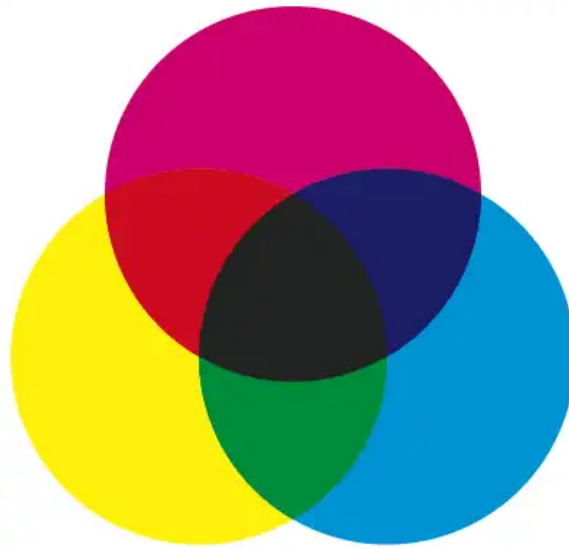


Fig. 1: With subtractive colour mixing, an infinite number of colour effects can be mixed together from just three colours. The more colours you mix, the darker the result.