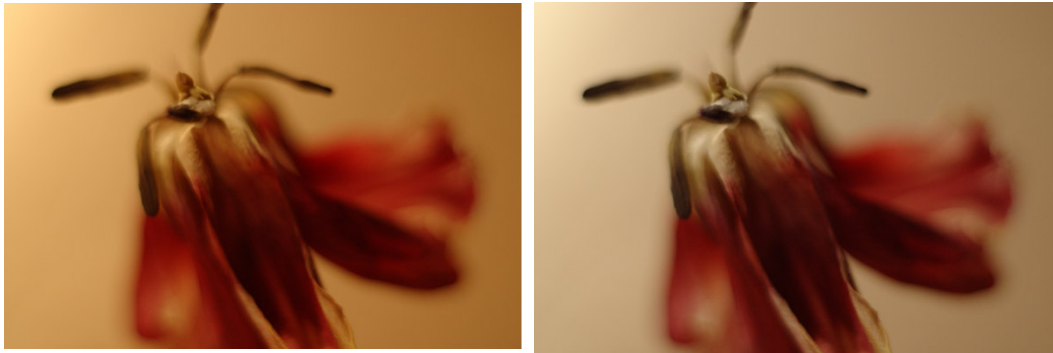


THE COLOUR TEMPERATURE OF LIGHT

Introduction

The fact that light has a colour temperature is not something most people are aware of. Unfortunately if you don't pay attention to the colour temperature of the light in which you are shooting it can reduce the quality of your pictures and even ruin them altogether.

All white light has a colour temperature which is measured in Kelvin or K. Now don't stop reading at this point if you think this all sounds technical because it's surprisingly easy once you have the basics. For example a general everyday light bulb has a colour temperature of around 2,800K, which gives it a warm red tone. Generally you are unaware of this tone as your brain compensates for it and you believe the light is white. You only become aware of the "colour shift" of the light when you take a picture as the camera does not compensate (at least without a little help) for it like your brain does. An example of this effect is shown below.



The image on the left was taken under a halogen light and the image on the right shows how this would have looked had it been taken in daylight. Notice how the image on the left has a warm red tone to it. This effect can be artistically useful but you first need to understand how to control it.

Light Temperature

Having established that light can have different colour temperatures and that this can give rise to changes in the colour tone of your images, let's have a look at some of the common lighting situations you might come across.

On a clear sunny summers day (no clouds in the sky) at 12:00 midday the colour temperature of light is likely to be around 5,500K. If we introduce some cloud and make the sky overcast the colour temperature might rise to around 7,000K. If we move ourselves into a shaded area, perhaps under a tree, the colour temperature could rise to 8,000K or even higher. The effect this gives is to make the light turn blue and images start to look cool or cold. Only at 5,500K does white actually look white without our brains compensating. Generally speaking the lower the colour temperature the warmer the light and the higher the colour temperature the colder the light. Light therefore moves from being a warm red colour through white to a cool blue.

Once you understand how colour temperature affects the colour of light you need to understand the factors that can affect it:

- Time of day – Only at midday is light going to be around 5,500K. Before and after midday the colour temperature is lower and the light is warmer in tone. The effect is however only really noticeable around sunrise and sunset when the colour temperature is quite low.
- Weather Conditions – Cloudy overcast skies cause the colour temperature to rise and the light takes on a blue cast
- Shade – Similar to an overcast sky, pictures taken in the shade can appear cold and take on a blue cast.
- Altitude – When taking pictures at altitude the colour temperature can increase significantly and objects take on a strong blue cast.

The following table provides basic information about typical light conditions or sources and the colour temperature you might expect to encounter.

Light Source	Colour Temperature
Average Shade	8,000K
Overcast Sky	7,000K
Lightly Overcast Sky	6,000K
Flash	5,800K
Daylight	5,500K
Early Morning / Late Afternoon	3,500K
Domestic Lights	2,800K
Sunset	2,000K
Candle	1,850K

Correcting Colour Cast

Having determined that different lighting situations can create a colour cast in your images you might be wondering how to correct the problem. The solution differs depending on whether you are using film or digital.

Images on Film

Where you are shooting on film you only really have one option (unless you are willing to scan your shots and correct them in Photoshop later) and that is to use a colour correction filter to balance the light colour. To compensate for a high colour temperature (that give a blue colour cast) use one of the 81 series of filters. These have an orange appearance and come in a number of strengths from A to EF. The weakest filter is the 81A. In order of increasing strength the filters are 81A, 81B, 81C, 81D and 81EF.

Typically with the colour temperature around 6,000K you might use the 81A or 81B. As it rises to 7,000K you might select an 81C or 81D and at 8,000K the 81EF is likely to be useful. This however is only a rough guide and you are best experimenting with a little with the type of film you will be using (taking notes of course).

If the colour temperature is low and you want to counter the warm orange colour cast you could select one of the blue filters in the 80 range. Use an 80A to counter very low temperatures or an 80B if the temperature is nearer that of daylight. Again the best advice I can give is to experiment, take notes and learn for your camera and film.

One final point when using filters is to remember that filters absorb light. This is fine if you are using your cameras built in meter, as the camera will adjust the settings accordingly. If however you are using a hand held light meter you will need to

compensate for this absorption by increasing the exposure you use. By how much will depend on the filter but it will typically be between 1/3 and 2/3 of a stop.

Digital Images

Managing colour temperature is much easier with a digital camera and the solution is also much more flexible. The first option is simply to put a filter on the front of your camera as described above. This solution might not work as well as you would expect however due to the white balance setting of the camera. This white balance setting is really the correct way to manage colour temperature when shooting digitally.

Most digital cameras have a number of white balance settings. Ignoring the AWB setting (Auto White Balance) there are usually settings for indoors, sun, cloudy and flash. When you select one of these you are setting the camera to compensate for the likely colour temperature.

On more advanced cameras (usually digital SLR's) there is a custom white balance setting. This allows you to take a picture of a white object and then have the camera determine the correct white balance for the object. This can then be used as the white balance for other shots. This can be a good option where the lighting conditions are constant such as in a studio but it may not be so good for outdoor work where the sun keeps passing behind a cloud.

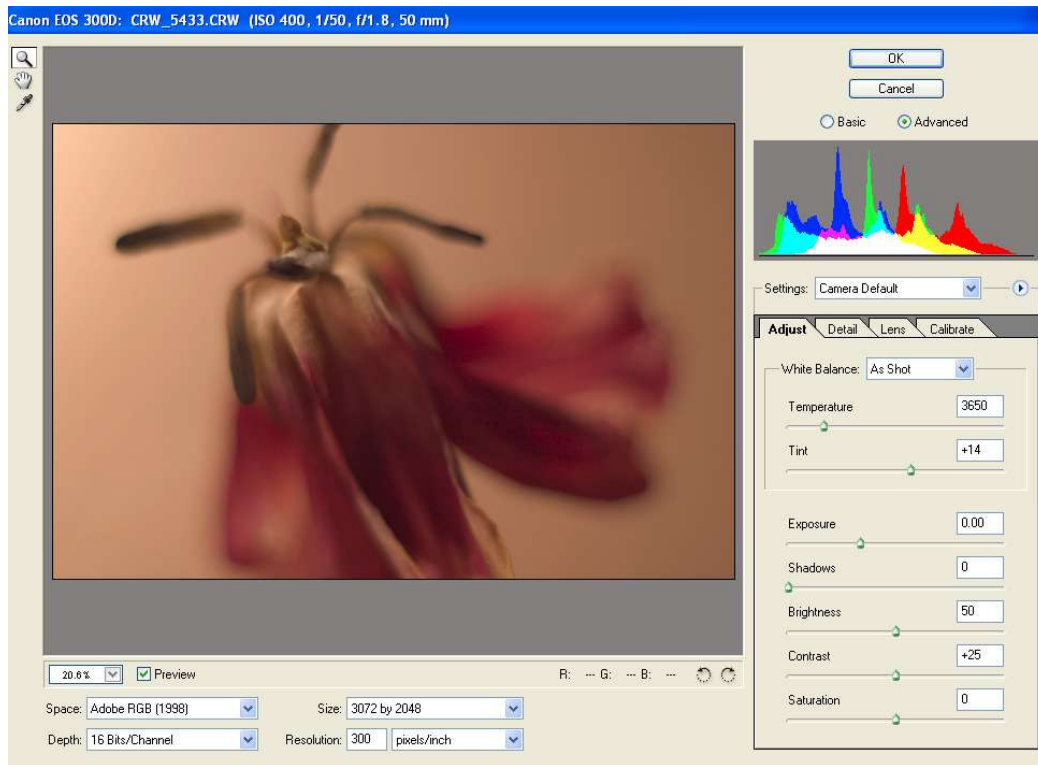
The option that I prefer for general shooting is also the simplest option that most people use by default and that is AWB. In this mode the camera attempts to guess the correct white balance and adjust the colour temperature accordingly. Sometimes the camera will get this wrong but you can correct the problem as I will explain in a moment. The message though is that you should always take note of your white balance setting and understand why you have it set as you do.

One final word of warning though if you chose to shoot in AWB mode is to take care. If you are shooting a sunset or a sunrise then you definitely do not want to use AWB as the camera will try to compensate for the warm tones in the light and set them to white. To keep the warm tones it is best to select the daylight balance.

Post Digital Capture

Having captured a digital image lets imagine that you discover that it has a warm red colour cast that you don't want; what can you do? Well the first point is you should have been shooting with the camera set to RAW format. This allows you to make adjustments to the picture later in suitable software. If you have been shooting in JPG format then you will need to use an image editing package such as Photoshop (the process for which is not covered within this article).

If you are using the CS version of Adobe Photoshop or later, you can open RAW files directly without first having to convert them to TIFF's or JPG's. When you do this you will be presented with a range of options as shown below. This includes a colour temperature slider that can be used to correct the colour temperature of the shot or set it to anything you please. This can help open up a whole new realm of artistic control.



Most digital SLR manufacturers also bundle software solutions with their cameras to allow this kind of on-image correction of RAW files. You can also try free software solutions such as RawShooter from Pixmantec, a link for which is provided on the Links page of the Lenscraft web site. Whichever option you choose it's worth spending time to understand how colour temperature works and how you can control it.

Having selected the desired colour temperature simply open your image and process it as usual. Another benefit of working in this way with RAW files is that the image file is never changed. Instead the settings are applied only to the new image that is generated.

The best thing now is to get some practice in with your chosen method.