Choosing and Using Telescope Filters

By Matthew West
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References

☐ Choosing:


☐ https://www.telescopesplus.com/blogs/helpful-information/18963396-how-filters-can-better-your-view

☐ http://www.wikihow.com/Use-a-Color-Filter-for-a-Telescope

☐ DSO:


☐ http://www.prairieastronomyclub.org/useful-filters-for-viewing-deep-sky-objects/

☐ http://quarkyscience.ca/shop/crystalview-moon-skyglow-filter-1-25/
Topics

- What are filters?
- How do I use them?
- What is the best filter for…
  - …Planets?
  - …The Moon?
  - …Deep Sky Objects?
What are filters?

Do I really need them?
Colour filters block certain wavelengths of light, while allowing other wavelengths to pass. For example, a red filter blocks out all but the red wavelengths of light.

If you look at an object that is primarily red, the object appears very bright.

Areas which are not red appear dark because they contrast with the wavelength of light being passed by the filter.

Filters can greatly enhance your ability to discern small details on solar system and deep sky objects.

Other filters reduce the amount of light or polarize the light, making it easier to see details on bright objects.
Use coloured filters for observing the Moon and the planets.

VLT: Visible Light Transmission

The % of light allowed to pass through the filter

The lower the VLT number, the dimmer an image will appear.
The smaller the aperture of your scope, the higher the VLT you should use.

<40% VLT are not recommended for telescopes with an objective aperture of less than 150mm/6 inches.

Filters can be stacked, but VLTs are compounded.
Opinions: Do I really need colour filters?

☐ No: Most observers would be much better served by having a range of high-quality neutral density filters at their disposal (50%, 25% and 13%, for example) to reduce brightness and allow faint details to be seen instead of being washed out. Useful for planets and splitting binaries.

☐ Maybe: An orange filter can help with viewing the darker Martian features when close to opposition.

☐ Yes: They reduce glare and light scattering, increase contrast through selective filtration, increase definition and resolution, reduce irradiation and lessen eye fatigue.
How do I use them?

Quick demo!
Installing a filter

- Remove eyepiece from telescope
- Thread the filter into the bottom of the barrel
- Replace the eyepiece onto the telescope
- View!
How do I choose them?

Go with what works!
Choose the right filter for what you want to see!
<table>
<thead>
<tr>
<th>Written Number and Color</th>
<th>Moon</th>
<th>Mercury</th>
<th>Venus</th>
<th>Mars</th>
<th>Jupiter</th>
<th>Saturn</th>
</tr>
</thead>
<tbody>
<tr>
<td>#8 Light Yellow</td>
<td></td>
<td></td>
<td></td>
<td>Maria, Dust clouds</td>
<td>Belts</td>
<td></td>
</tr>
<tr>
<td>#11 Yellow-Green</td>
<td></td>
<td></td>
<td></td>
<td>Maria</td>
<td>Belts</td>
<td>Cassini Division</td>
</tr>
<tr>
<td>#12 Yellow</td>
<td></td>
<td></td>
<td>Improves contrast</td>
<td>Maria, Atmospheric clouds</td>
<td>Belts, Poles</td>
<td></td>
</tr>
<tr>
<td>#15 Dark Yellow / Amber</td>
<td>Useful</td>
<td>Daylight</td>
<td>Low contrast clouds</td>
<td>Maria, Dust clouds, Polar regions</td>
<td>Belts, Poles, Festoons</td>
<td></td>
</tr>
<tr>
<td>#21 Orange</td>
<td>Very useful</td>
<td>Daylight surface</td>
<td>Surface edge detail</td>
<td>Belts, Red spot, Festoons</td>
<td>Bands, poles</td>
<td></td>
</tr>
<tr>
<td>#23A Light Red</td>
<td>Daylight, Twilight</td>
<td></td>
<td>Maria and surface, Dust clouds, Polar caps</td>
<td>Blue clouds</td>
<td>Blue clouds</td>
<td></td>
</tr>
<tr>
<td>#25 Red</td>
<td>Daylight, Twilight</td>
<td>Upper clouds</td>
<td>Maria, Polar caps</td>
<td>Improves contrast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#29 Dark Red</td>
<td></td>
<td>Terminator</td>
<td>Maria, Polar caps</td>
<td>Moon transits</td>
<td>Clouds</td>
<td></td>
</tr>
<tr>
<td>#38A Dark Blue</td>
<td></td>
<td>Upper clouds</td>
<td>Dust storms, Polar caps, Violet clearing</td>
<td>Belts, Red spot</td>
<td>Bands, rings</td>
<td></td>
</tr>
<tr>
<td>#47 Violet</td>
<td>Useful</td>
<td></td>
<td>Upper clouds</td>
<td>Clouds and haze above poles</td>
<td>Ring detail</td>
<td></td>
</tr>
<tr>
<td>#56 Light Green</td>
<td>Useful</td>
<td></td>
<td>Improves contrast</td>
<td>Dust storms, Polar caps</td>
<td>Red Spot</td>
<td>Bands, Poles</td>
</tr>
<tr>
<td>#58 Green</td>
<td>Useful</td>
<td></td>
<td>Improves contrast</td>
<td>Dust storms, Polar caps</td>
<td>Belts</td>
<td>White bands, Poles</td>
</tr>
<tr>
<td>#80A Blue</td>
<td>Very useful</td>
<td>Twilight surface</td>
<td>Upper clouds</td>
<td>High clouds, Ice caps</td>
<td>Rills, Festoons, Red Spot</td>
<td>Bands, Poles</td>
</tr>
<tr>
<td>#82A Light Blue</td>
<td>Useful</td>
<td>Twilight surface</td>
<td>Upper clouds</td>
<td>Polar caps, Surface</td>
<td>Belt transition</td>
<td>Band transition</td>
</tr>
</tbody>
</table>
What are the best filters for Mars?

–Let the red out
- #8 Light Yellow - 83% VLT: increases the detail in the maria
- #11 Yellow Green - 78% VLT: darkens the maria
- #12 Yellow - 74% VLT: brings out the polar ice caps, enhances blue clouds, increases contrast, and brightens desert regions
- #21 Orange - 46% VLT: assists in detecting dust storms
- #23A Light Red - 25% VLT: sharpens boundaries and increases contrast
- #25A Red - 14% VLT: provides maximum contrast of surface features and enhances surface detail, polar ice caps, and dust clouds
- #38A Dark Blue - 17% VLT: provides detail in atmospheric clouds, brings out surface phenomena, and darkens red areas
- #56 Light Green - 53% VLT: enhances frost patches, surface fogs, and polar projections
- #80A Blue - 30% VLT: provides detail in atmospheric clouds
What are the best filters for Jupiter?

- How to spot the spot
- "#8 Light Yellow - 83% VLT: enhances detail in the belts"

- "#11 Yellow Green - 78% VLT: brings out dark surface detail"

- "#12 Yellow - 74% VLT: enhances red and orange features; darkens blue festoons near the equator."

- "#21 Orange - 46% VLT: brings out the Great Red Spot and sharpens contrast"

- "#23A Light Red - 25% VLT: sharpens belt contrast"

- "#25A Red - 14% VLT: sharply defines differences between clouds and surface features"

- "#38A Dark Blue - 17% VLT: increases contrast in large scopes"

- "#47 Violet - 3% VLT: recommended only for large telescopes; darkens the belts"

- "#58 Green - 24% VLT: increases contrast on lighter parts of the surface"

- "#80A Blue - 30% VLT: perhaps the best filter for the study of detail; enhances the contrast of rills and festoons in the cloud belts and details of the Great Red Spot."
What are the best filters for Saturn?

- Shoulda put a ring on it
#11 Yellow Green - 78% VLT: brings out dark surface detail

#12 Yellow - 74% VLT: enhances red and orange features

#38A Dark Blue - 17% VLT: increases contrast

#47 Violet - 3% VLT: increases contrast in the rings

#58 Green - 24% VLT: brings out the cloud belts and polar regions

#80A Blue - 30% VLT: brings out detail in belts and polar features
What are the best filters for Uranus and Neptune?

–Get the green out
- #8 Light Yellow - 83% VLT: increase resolution of detail
- #11 Yellow Green - 78% VLT: improves visual detail
What are the best filters for Mercury and Venus?

–Tone it down!
- #23A Light Red - 25% VLT: stands out from the blue sky when viewed during the day
- #25A Red - 14% VLT: reduces light glare
- #38A Dark Blue - 17% VLT: increases contrast
- #47 Violet - 3% VLT: reduces glare
- #58 Green - 24% VLT: Venutian atmospheric features
What are the best filters for The Moon?

–Sailing on the maria
#8 Light Yellow - 83% VLT: enhances detail in smaller scopes

#11 Yellow Green - 78% VLT: a great general-purpose filter

#21 Orange - 46% VLT: greatly enhances features

#58 Green - 24% VLT: increases contrast on the lighter parts of the surface

#80A Blue - 30% VLT: increases contrast
What are the best filters for Deep Sky Objects and Binary Stars?

–It’s about the contrast
**Major Filter Types**

**Broad-band "LPR" Filters**
Attempts to "notch-out" major skyglow bands while passing as much of the rest of the spectrum as possible.
Examples: Lumicon Deep-sky, Orion Skyglow

**Narrow-band "Nebula" Filters**
Only lets through the OIII and H-Beta nebula lines together while excluding most of the rest of the visual spectrum.
Examples: DGM NPB, Lumicon UHC, Orion Ultrablock

**Line "Nebula" Filters**
Lets through only one or two spectral lines from a specific element in the nebula (OIII lines only or the H-Beta only).
Examples: Lumicon OIII, Lumicon H-Beta

http://www.prairieastronomyclub.org/useful-filters-for-viewing-deep-sky-objects/
Crystalview Moon, Skyglow, and other Broadband Filters

- Improves the blocking of mercury-vapour light and higher transmissions, at the critical hydrogen-alpha and hydrogen-beta lines.

- Bright, light-polluted skies appear darker

- The contrast between the object viewed and sky is improved

- Best suited for viewing galaxies and star clusters, whose own light spans the entire visible spectrum
Nebula Filters: Narrow Band and Line

- Block out most of the visible spectrum
- Allows maximum transmission of the wavelengths most commonly emitted by nebulae:
  - Oxygen-III filters enhance views of planetary nebulae and a few supernova remnants
  - Hydrogen-alpha filters enhance views of emission nebulae
  - Hydrogen-beta filters are optimal for a handful of extremely faint targets, such as the California Nebula and IC 434 (the Horsehead Nebula)
Neutral Density Filters

- Can help split binaries by reducing the brightness of the primary star.
#80A Blue - 30% VLT: helps to split the binary star Antares when at maximum separation

#82A Blue - 30% VLT: helps to increase structure detail when looking at galaxies