Single Scatter Parameters

> ⚠️ In the parameters below, some of them can be overridden by a PxrLayer when connected to the **Input Material** or through a PxrLayerMixer. Pxr LayerSurface is designed to better illustrate which parameters are not able to be overridden in a layer by including only parameters that are global. We recommend this material when you know you will be layering. The results of these settings are unchanged.
>
> - **Bold Face** parameters are layerable, able to be overridden per layer.
> - *Italicized* parameters are not able to be layered or overridden. These are globally obeyed for all layers. For example: Choosing GGX as a specular model will mean all layers will be GGX for that parameter.
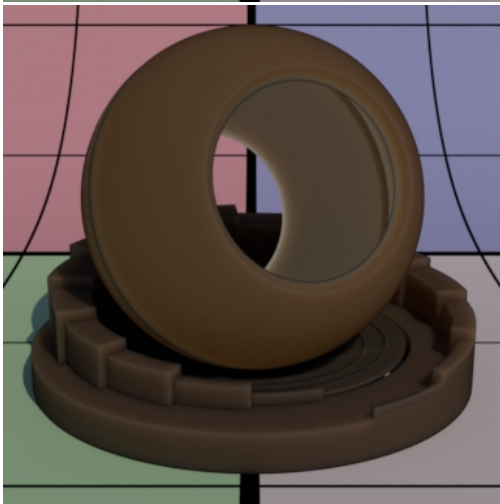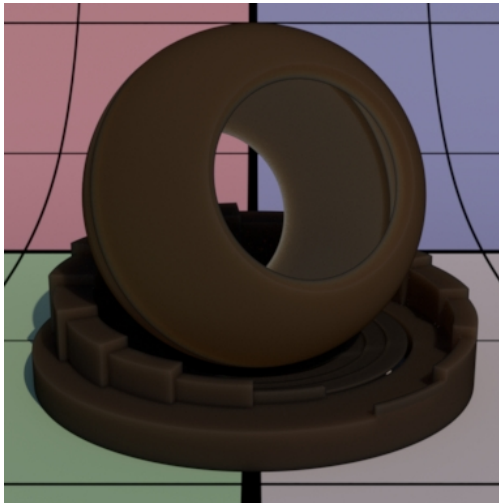
Single Scattering Parameters

Single scatter is a simple and inexpensive effect for scattering effects. Below a *disk light is placed inside the model* (for all of these examples) and we render using no diffuse color and again with a default middle grey diffuse color.
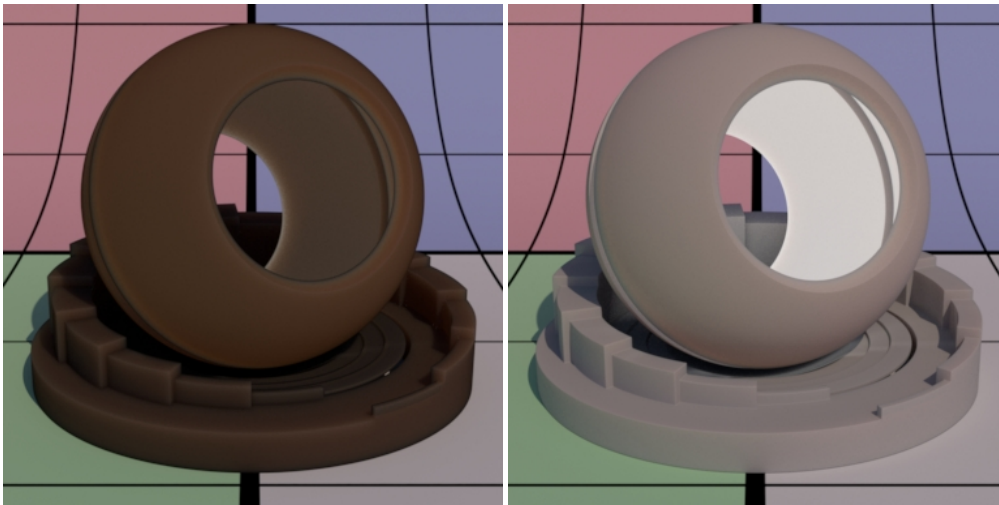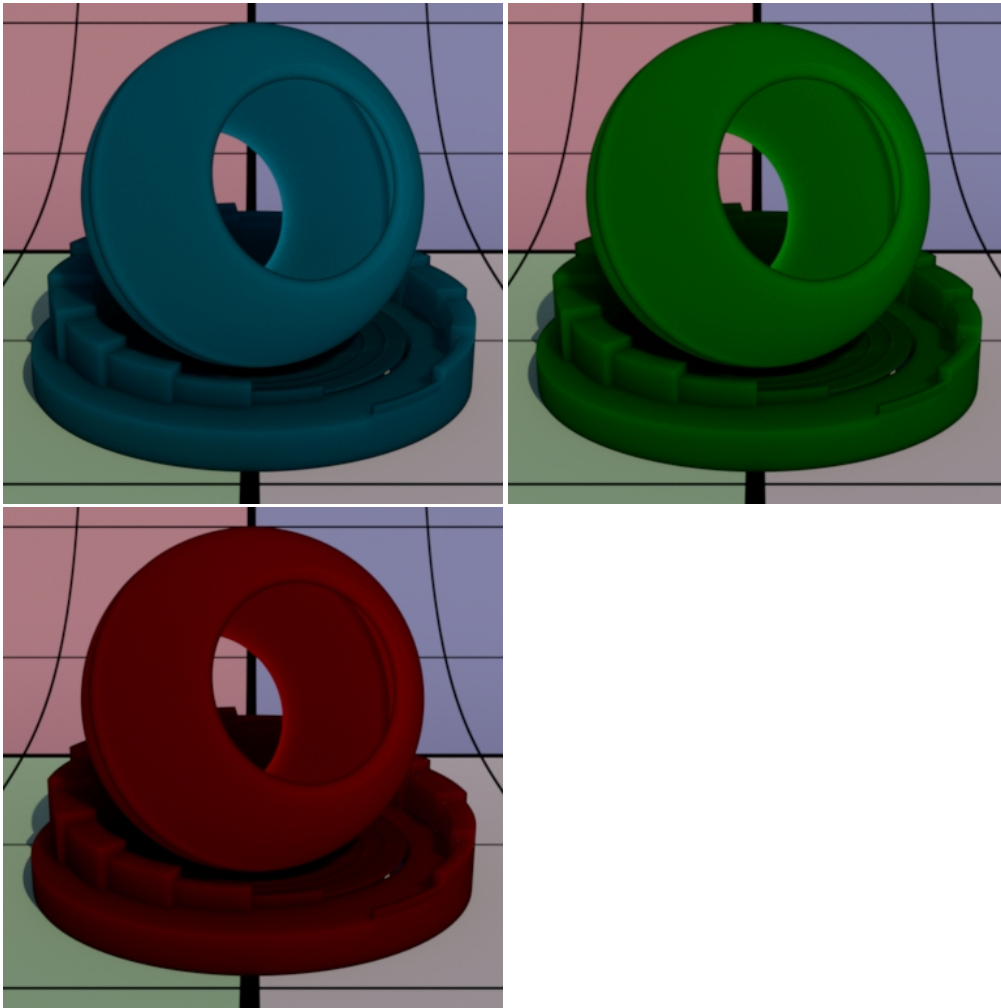

Gain

Single scatter gain or weight.

Color

Single scatter color.

Mean Free Path

Single scattering mean free path scalar distance. This specifies how far the light travels inside an object and as a consequence how smooth the single scattering is. This gets multiplied by the unit length set in the Properties section. Larger values are more translucent.

Mean Free Path Color

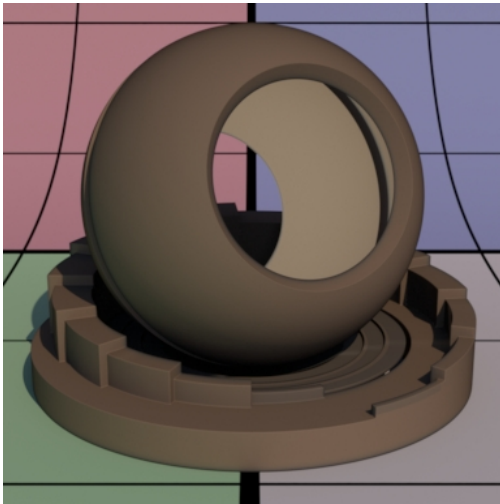How far the light travels in the R, G, and B spectra. This is scaled by Mean Free Path Distance.
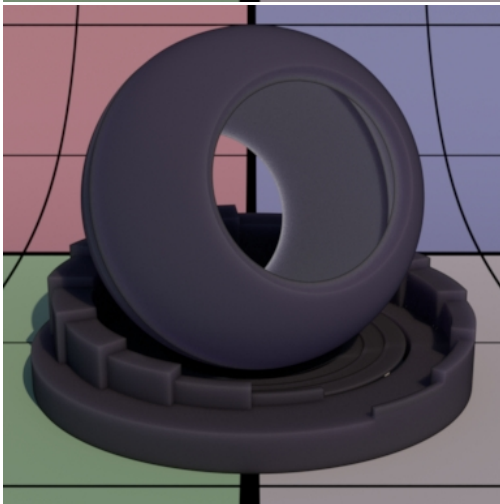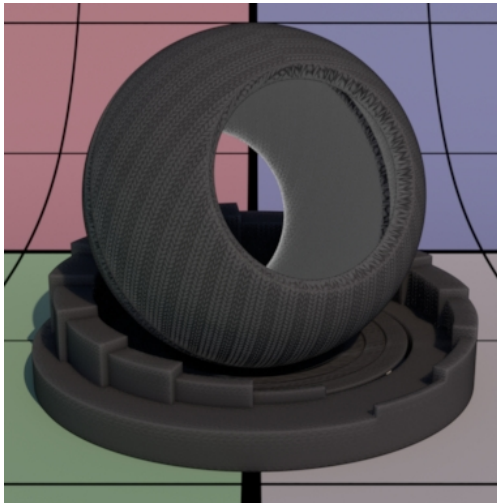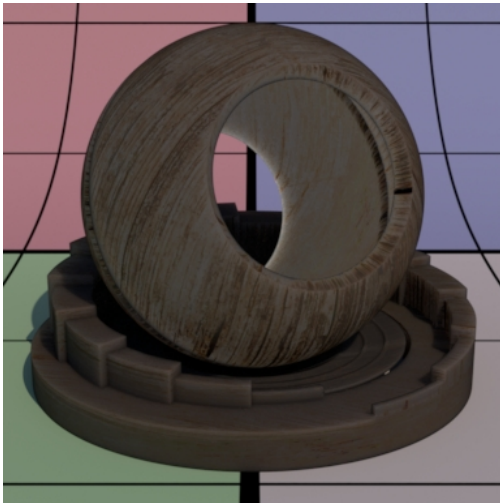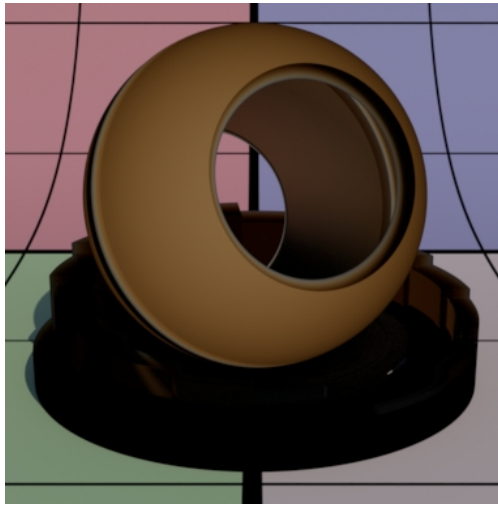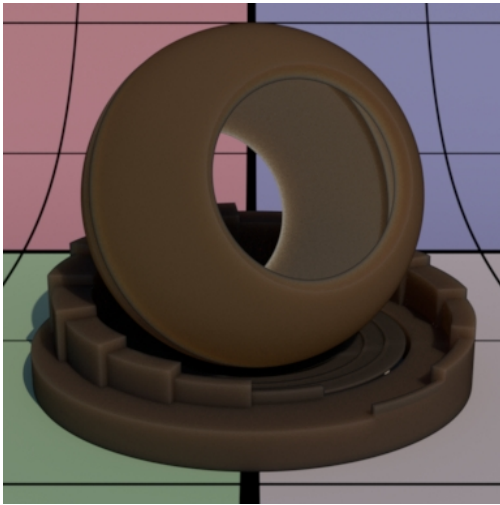
Directionality

Single scatter directionality:

0 : isotropic (no effect).

1 : forward scatter which is more light on the backside.

-1: backward scatter which is more light on the front side.

Refractive Index

Single scatter index of refraction. Below are 1.3, 5.0, and then 10.0
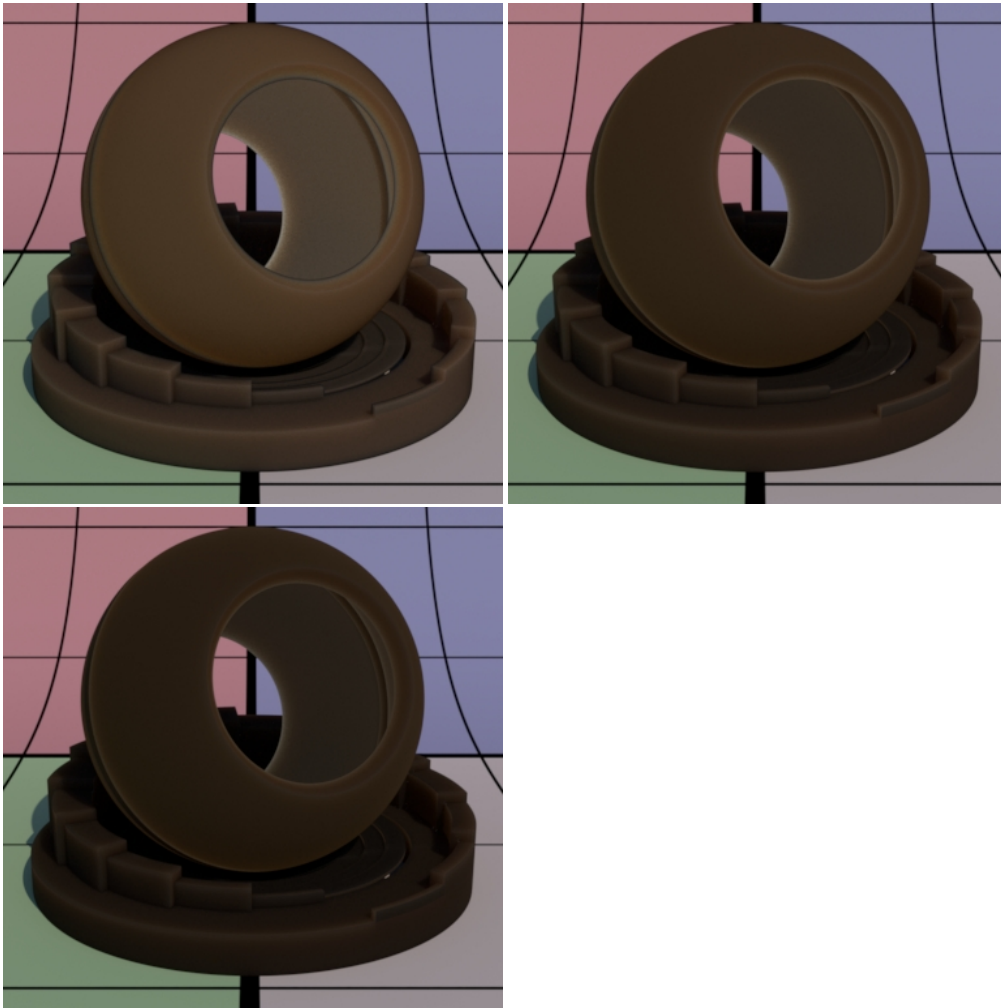
Blur

Blur strength for single scatter. This polygonal plane as some text behind it. Increasing the blur causes the text to appear blurrier (and darkens the result some). You may think of this as roughness forscattertransmission.
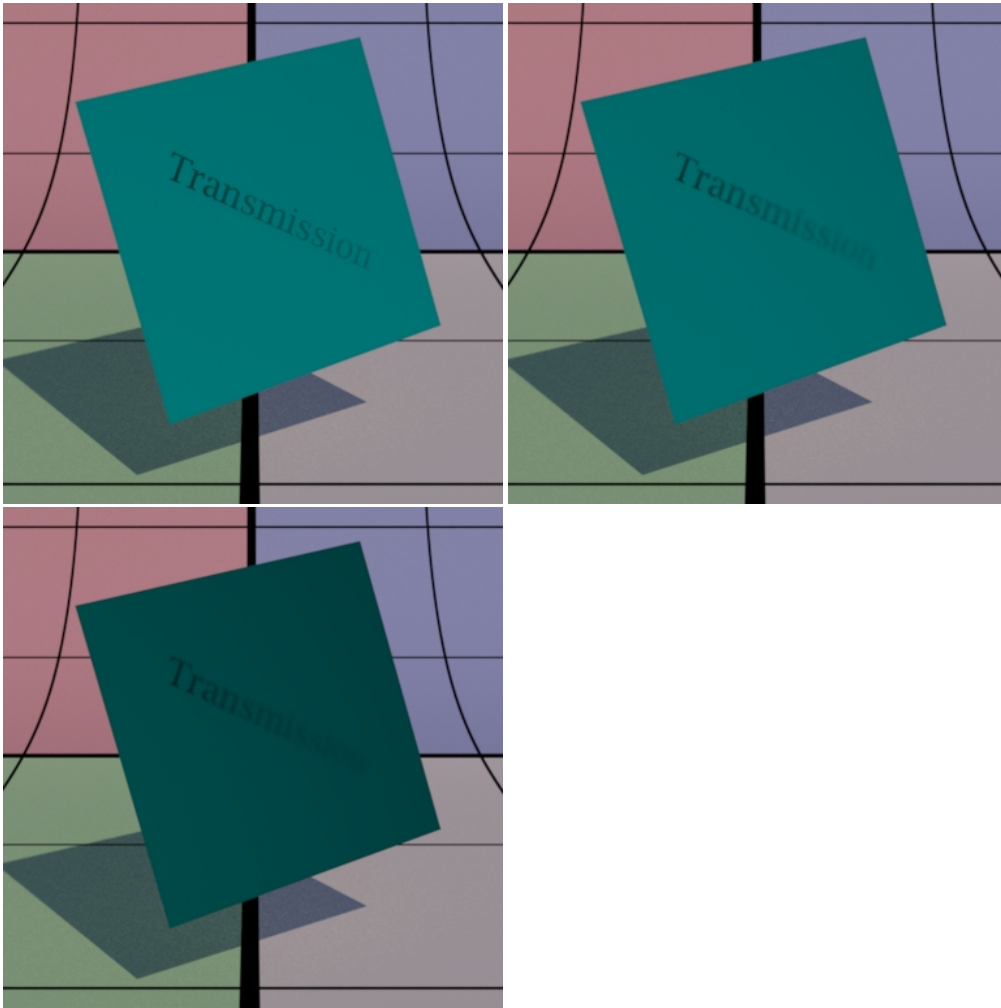
Backside Direct Illum Gain

Gain for direct illumination from the other side. This increases the influence of backside illumination.
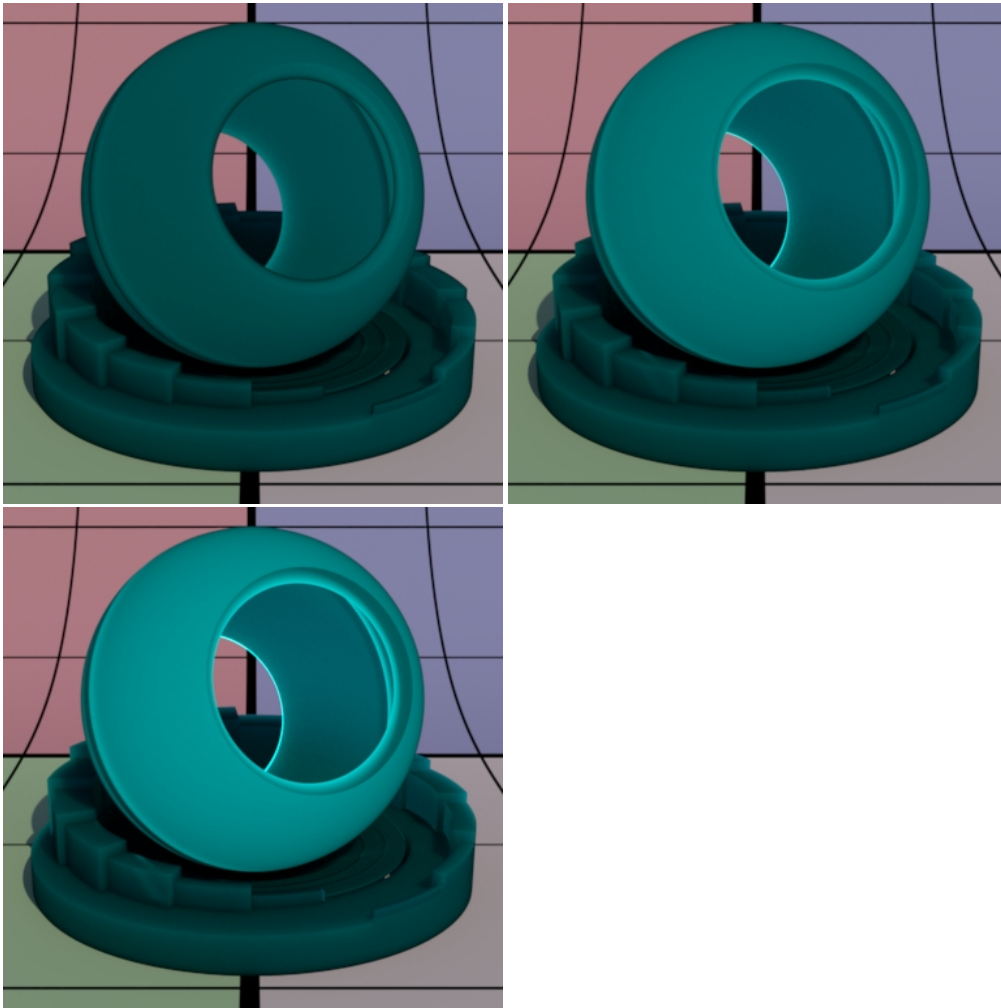
Direction Tint

Tinting color for the Backside Direct Illum Gain. Below uses different colors to tint the result from the first image, which is white.

Double Sided

If on, illuminate on both sides of the surface for this single scatter lobe, that is, this will illuminate the surface whose normal is pointing away from the camera as well.
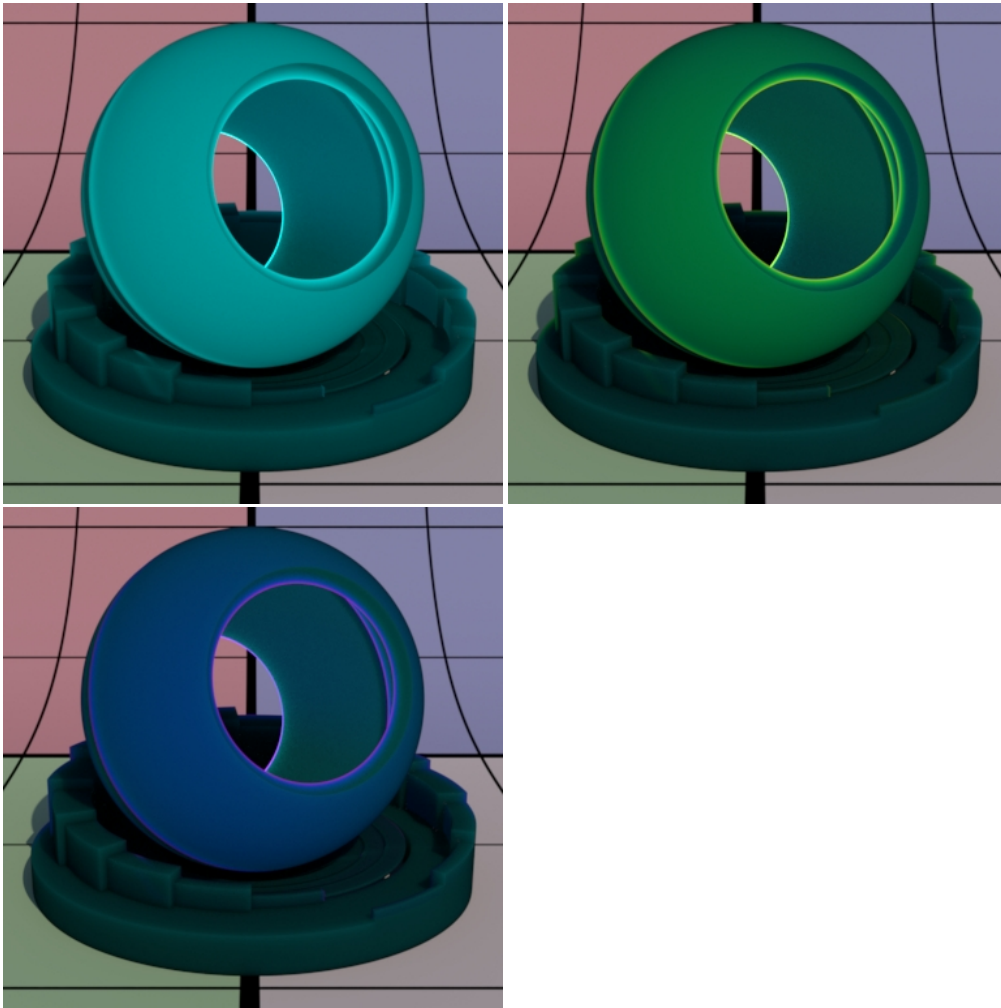
Trace Control Parameters (Operate similarly to Subsurface Controls Shown in their explanation):

Consider Backside

Whether subsurface respects surfaces on the other side. This is for the hit side, not the illuminating side (which is singlescatterDoubleSided):

- "Off" - It will ignore surfaces on the other side completely. This is useful to make objects appear thicker than they are.
- "On" - Normal mode, where the diffusion happens between the front and the first surface behind it.

Continuation Ray Mode

Control continuation ray mode:

"Off" - Simply trace out of the object (default).

"Last Hit" - Ignore internal geometry and jump to the last surface.

"All Hits" - Scatter (collect light) on all hits as the ray leaves the object. This can bring additional brightness, at the cost of additional noise.

Max Continuation Hits

Maximum number of hits to test in all hits mode. This is only valid when Continuation Ray Mode equals All Hits

Direct Gain Mode

Control continuation ray mode:

"First Hit" - Simply trace to the next surface (this is tied to considerBackside).

"Last Hit" - Ignore internal geometry and jump to the last surface.

"All Hits" - Scatter (collect light) on all hits as the ray leaves the object. This can bring additional brightness, at the cost of additional noise.
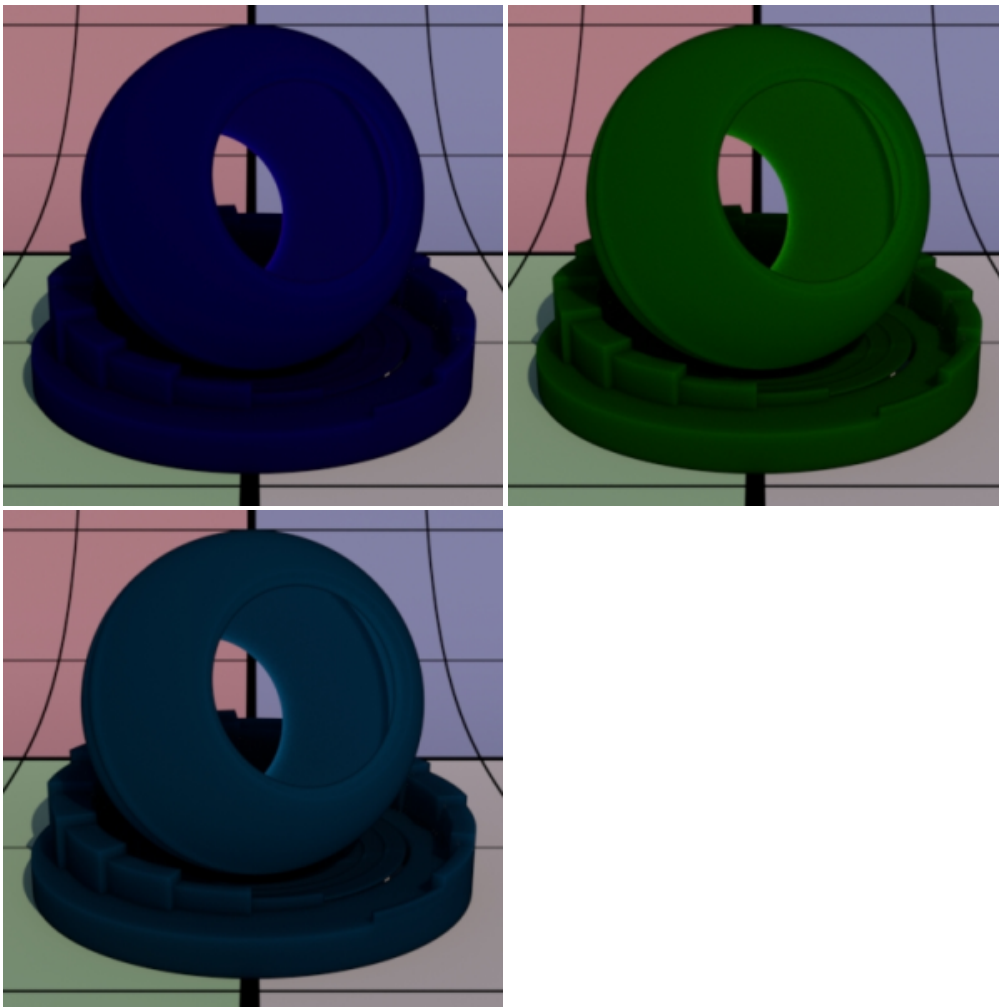
Trace Subset

Specify trace subset for inclusion/exclusion when struck by a ray indirectly.

Scattering Globals

Irradiance Tint

A tint applied to illumination before being scattered by subsurface or single scatter.
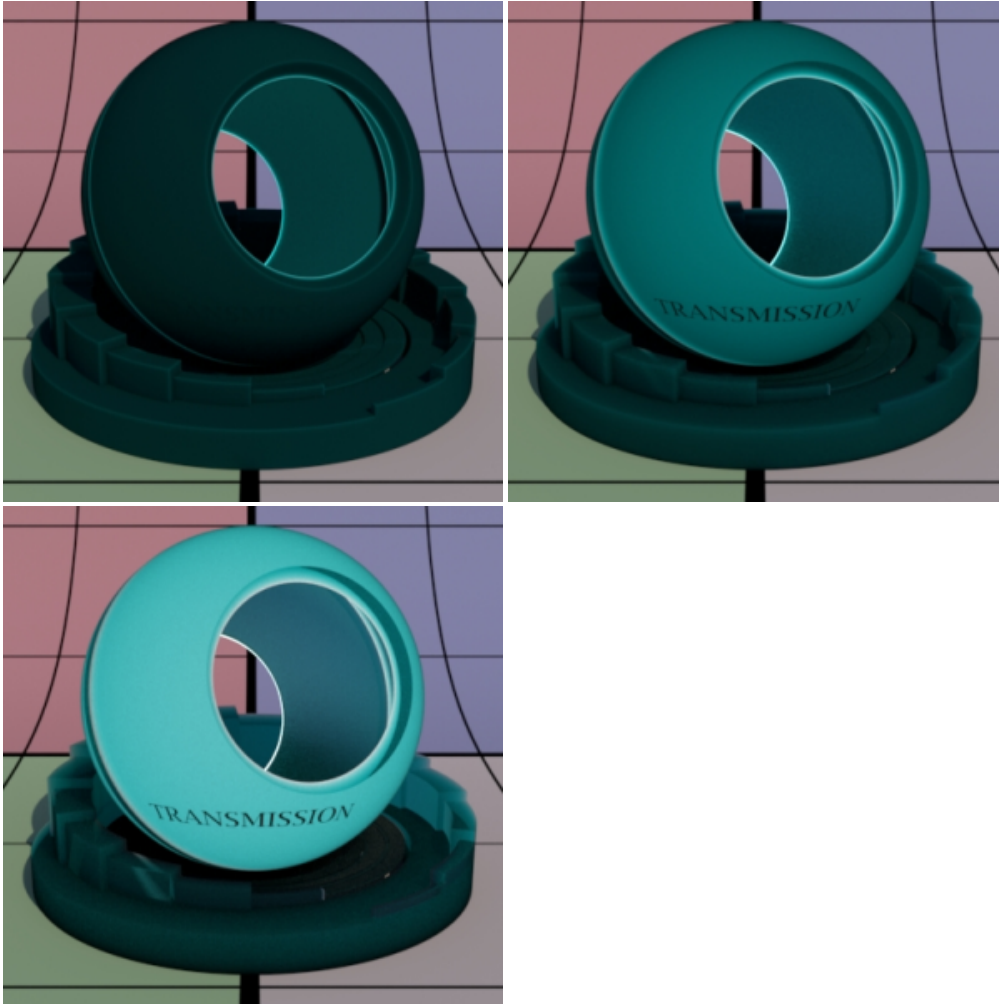
Irradiance Roughness

Diffuse roughness to be applied for subsurface or single scatter. A value of 0 represents classic Lambertian shading model. Non-zero values increase the microfacet roughness for the Oren-Nayar shading model. A greater value produces rougher diffuse and may appear slightly darker.

Unit Length

Subsurface and single scatter unit length. It is a multiplier on Mean Free Path Distance. Mean Free Path Distance is often measured in millimeters. If the scene is modeled in some other scale, Unit Length should be set accordingly. The default value of 0.1 is appropriate for scenes modeled in centimeters (the default in Maya) and Mean Free Path Distance measured in millimeters. Small numbers make the object more diffuse (less translucent) while larger numbers increase the scatter effect, making it more translucent.

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