

*This chart has been adapted by Elise Skalwold from one received with no attribution and is not intended to be all inclusive. For more information, see paper by Jill Hobbs in G&G Spring 81 "A Simple Approach to Detecting Diamond Simulants" which covers more ground and includes a nice chart.

Diamond Simulant Separation Procedure

Stone RI is **OTL**
Colorless Round Brilliant Cut

Return to Gemology Resources:
<http://www.nordskip.com/resources.html>

Check for Doubling

- Look through pavilion as well as through crown facets
- Observe in at least **three** directions
- Rock and tilt stone

If you find **no doubling**, assume
Singly Refractive (SR)
Isotropic

Your possibilities are:

- **Diamond** SG 3.52
- YAG (man-made) SG 4.55
- Strontium Titanate (man-made) SG 5.13
- CZ (synthetic) SG 5.80
- GGG (man-made) SG 7.05

Check for **natural inclusions**:
Look for a bruted girdle, naturals on girdle, and natural inclusions like xtls or indented naturals to indicate diamond

Check for **see-through**:
Table down on paper, can you see text through pavilion facets?

- No: your possibilities are **diamond, strontium titanate** (both no see-through) or **CZ** (perhaps slight see-through)
- Yes: you may have **GGG** or **YAG**.

Check for the **dispersion**:

- **Strontium Titanate - strong**
- Diamond - Moderate
- CZ - Moderate
- GGG & YAG - Weak
GGG does not appear to have much dispersion even though its value is 0.045 (Hobbs, 1981)

Check for **pavilion flash** in darkfield illumination:

- CZ - orange (*tends to be all over while diamond may have some orange & blue on just a few facets*)
- GGG - blue & orange
- YAG - blue & violet (*over most facets*)
- Strontium Titanate - spectral colors wide-spread

Check for **heft**:
CZ (SG 5.80) will generally have a very strong orange pavilion flash. However, GGG and YAG may have similar pavilion flashes.
To separate these two, check the heft.

- GGG - very heavy (SG 7.02)
- YAG - slightly heavy (SG 4.55)

"See-through" is related to the material's RI which affects its critical angle. A lower RI creates a larger critical angle which in turn makes for a bigger window or see-through when comparing similarly proportioned round brilliant cuts. Colorless sapphire (1.762-1.770) has a very strong see-through as does colorless synthetic spinel (1.728). Glass (1.470-1.700) can have extreme see-through. The degree of see-through of OTL stones in this chart gives some hint of relative RI; Diamond (2.417) has none while GGG (1.970), Zircon (1.925-1.984) and YAG (1.833) have progressively more see-through as RI drops.

If you find **doubling**, assume
Doubly Refractive (DR)
Anisotropic

Your possibilities are:

- Zircon (natural) SG 4.77
- Syn. Rutile (synthetic) SG 4.26
- Syn. Moissanite (synthetic) SG 3.22

Check the **dispersion**:

- **Syn. Rutile** has **extreme dispersion!**
- Syn. Moissanite has strong dispersion.
- Zircon has moderate to weak dispersion.

Check for **natural inclusions**:

- Zircon may have natural inclusions like discoid fractures.
- Syn Moissanite may have thin needles coming down perpendicular from the table - though rarely in the modern versions.
- Syn Rutile is commonly free of inclusions.

Check the **doubling strength**:

- Zircon -**Strong** doubling (except metamict - very little or none - may be desaturated green, hazy)
- Syn. Rutile - **Extreme** doubling
- Syn. Moissanite -**Moderate** doubling - although modern versions much smaller doubling and often cut with SR direction perpendicular to the table so look in several directions.

Chart at Right

The keys to identifying colorless gems are specific gravity (SG) and birefringence. The stones at right are arranged by SG

Note that there are only three pairs of stones that share the same SG, in **Red**. In each case, one is DR and the other is SR.

It appears that zircon, which occasionally becomes almost SR, could be confused with YAG. However, anytime zircon becomes SR, the SG drops below that of YAG.
(Author Unknown)

Material	SG High	SG Low	Birefringence
GGG	7.09	6.95	None
CZ	6.00	5.34	None
Syn. Rutile	5.60	4.20	.287
Zircon	4.80	3.90	.000-.059
YAG	4.60	4.50	None
Sphene	3.55	3.45	.100-.192
Diamond	3.53	3.51	None
Syn. Moissanite	3.20	3.17	.043