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CARGILLE LABORATORIES
55 Commerce Road • Cedar Grove, New Jersey • 07009-1289 USA
Phone: 973-239-6633 Fax: 973-239-6096 www.cargille.com

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MICROSCOPE TECHNIQUES

The Becke Line Method

The Becke Line Method: This method, described originally by F. Becke in 1893 was applied to minerals adjacent each other in rock sections. He pointed out that by using a narrow cone of illumination when the minerals differed in the refractive indices, and when the focus was raised, a bright line appeared within the border of the mineral having the higher index. Lowering the focus below the plane of the section caused the bright line to travel into the mineral of lower index. This presupposes the plane joining the two minerals to be substantially vertical to the plane of the section. Should this plane be at a considerable angle, the effect can be nullified. While various explanations were offered to explain this phenomenon, they all boil down to the fact that the mineral with the higher index functions somewhat as a positive lens to bend non-parallel rays toward a focus above the plane of the specimen, hence the concentration of light within the mineral when the focus is raised. When a mineral grain is immersed in a liquid of lower index (as is done in making refractive index determinations) the same phenomenon occurs; the bright line moves into the mineral when the focus is raised. Should the liquid medium possess the higher index, the white line moves into the liquid on raising the focus. With identical indices there is no apparent difference in appearance when changing the focus either above or below the correct position. The Becke Method usually works best when the aperture of the illuminating cone from the condenser is reduced. Experience will indicate the best aperture with which to work. It will vary somewhat with changes in conditions, magnification, nature of particle, range of index, intensity of illumination, etc.

To improve the accuracy when using the Becke Line Method, we suggest using an interference filter for 589.3 nm as a source of monochromatic light. Monochromatic light eliminates problems of differing dispersion between the specimen and the Refractive Index Liquid. Also be sure the aperture diaphragm is closed all the way down. Be sure all polarizing stages are out of use, including substage polarizers.

Taken from Practical Refractometry by Means of the Microscope, by Roy M. Allen, D. SC. Pages 6 & 7, published by Cargille Laboratories, Inc., 55 Commerce Road, Cedar Grove, NJ 07009 USA