Polarizing microscopy

The polarizing microscope or “petrographic microscope” is used mainly in geological studies for geological specimens but also in medicine and biology. This type of microscope differs from the normal one by using a polarized light, in which the light waves vibrate in one direction. Unlike the ones from normal light that vibrate in random directions. It’s used in anisotropic materials (like minerals) because of their birefringent optical properties – they have several refractive indices. When studying a specimen the light has to pass through a polarizer (polarizing filter) and then in some cases through an analyzer – to increase the quality of image contrast.

What is a polarizing microscope?

A polarizing microscope can be obtain from a compound or a normal one by adding some pieces. The mainly differences between a polarizing microscope and other *microscopes:*

- A polarizer and analyzer
- A circular rotating stage
- Special plates placed between the object and light path.
- Bertrand lens (if necessary)

A polarizer is a filter that only allows specific light waves or vibrations to pass through it and focus them in a single plane. An analyzer, mainly used as a second polarizer located above the sample, determines the quantity and the direction of the light that illuminates a sample. Due to the use of these filters, the polarized light waves vibrate in one single direction, instead of the normal ones that vibrate in random directions. In this way the polarized light is more concentrated and then more efficient to the study of minerals, for example. By changing the relationship of the polarizer and the analyzer, it’s possible to determine the amount of absorbance, reflection and refraction of the light through the microscope.

Important Applications

It is mostly used in the field of geology to study rocks and minerals. Besides that can also be used in medicine, chemistry, biology and some times in metallurgy. it is the best choice to study materials like minerals, polymers, ceramics, wood, urea, substances of natural and synthetic fibers with those birefringent properties, cellophane, and also botanical and insect specimens and fish scales. With polarizing microscopy it is possible to determine the color absorption, structure, composition and refraction of light in isotropic (gases and liquids – one refractive index) and anisotropic substances.

Pathway of Light

- The light passes through a polarizing filter called the polarizer (the polarizer is fixed in an east to west vibrational way, but it can be rotated if necessary. There is one more polarizing filter called the analyzer. It is usually situated above the objectives and can be moved in and out of the optical path).
- Passes through the birefringent specimen. The polarizer is usually fixed in an east to west vibrational direction, but it can be rotated as required. There is one more polarizing filter called the analyzer. It is usually situated above the objectives and can be moved in and out of the optical path.

Links

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Bibliography

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