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1. Generally, knives are characterized by the profile of the knife blade, which falls under the categories of planar concave, wedge shaped or chisel shaped designs.

Planar concave microtome knives are extremely sharp, but are also very delicate and are therefore only used with very soft samples.[[14]](https://en.wikipedia.org/wiki/Microtome#cite_note-MVM-14) The wedge profile knives are somewhat more stable and find use in moderately hard materials, such as in epoxy or cryogenic sample cutting. Finally, the chisel profile with its blunt edge, raises the stability of the knife, whilst requiring significantly more force to achieve the cut.

For ultramicrotomes, glass and diamond knives are required, the cut breadth of the blade is therefore on the order of a few millimetres and is therefore significantly smaller than for classical microtome knives. Glass knives are usually manufactured by the fracture of glass bars using special "knife-maker" fracturing devices. Glass knives may be used for initial sample preparations even where diamond knives may be used for final sectioning. Glass knives usually have small troughs, made with plastic tape, which are filled with water to allow the sample to float for later collection.[[13]](https://en.wikipedia.org/wiki/Microtome#cite_note-Lang-13) Diamond blades may be built into such an existing trough, allowing for the same collection method.

**Sectioning**

Prior to cutting by microtome, biological materials are usually placed in a more rigid fixative, in a process known as embedding. This is achieved by the inflow of a liquid substance around the sample, such as paraffin (wax) or epoxy, which is placed in a mold and later hardened to produce a "block" which is readily cut.

The declination is the angle of contact between the sample vertical and knife blade. If the knife blade is at right angles (declination=90) the cut is made directly using a pressure based mode, and the forces are therefore proportionally larger. If the knife is tilted, however, the relative motion of the knife is increasingly parallel to sample motion, allowing for a slicing action. This behaviour is very important for large or hard samples

The inclination of the knife is the angle between the knife face and the sample. For anoptimal result, this angle must be chosen appropriately. The optimal angle depends upon the knife geometry, the cut speed and many other parameters. If the angle is adjusted to zero, the knife cut can often become erratic, and a new location of the knife must be used to smooth this out.

If the angle is too large, the sample can crumple and the knife can induce periodic thickness variations in the cut. By further increasing the angle such that it is too large one can damage the knife blade itself.

2) knife marker



Profiles of microtome knives.

References

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