LATTICE PLANE RESOLUTION TESTS
Product No. 624, 629-1, 645, and 646

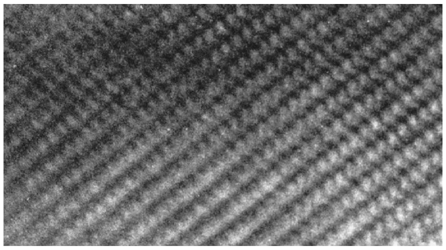
The resolution of crystal lattice planes is a useful test of the performance of an electron microscope, particularly mechanical and electrical stability. The crystal spacings are known accurately from X-ray data, and therefore the high magnification used can be calibrated with accuracy.

The crystal specimens are mounted on perforated carbon films; wherever possible, thin crystals that cross one of the holes should be selected so that interfering structure from the support film is not encountered.

Good crystals can usually be located by checking the selected area diffraction pattern; unless a clear single crystal pattern is obtained, the lattice planes will not be observed. When a suitable crystal has been selected, a very high electron optical magnification should be used, so that the lattice planes can clearly be resolved on the fluorescent screen under the viewing telescope. The objective lens focus has to be adjusted carefully to optimize the contrast. The phase contrast of a given crystal lattice spacing is critically dependent on the amount of objective lens defocusing.

If the contrast is inadequate, a significant improvement may be obtained by defocusing the condenser lens (reduction of illumination semi-angle).

Further improvement may be brought about by tilting the illuminating beam so that the central beam and first order diffraction spot are symmetrical about the instrument axis (take care that the objective aperture is large enough to accept the diffracted beams).



Product No. 624 **Asbestos (Crocidolite)** Lattice plane spacing 0.903 and 0452nm

These crystals occur as long needles and display good diffraction patterns. The (020) planes parallel with the long axis of the crystals are of the 0.903nm spacing; the (021) planes of spacing 0.452nm lie at about 60 degrees to this.

Some of these crystals in the preparation show a globular structure under electron irradiation, but a good proportion of the crystals appear unaffected by the beam, and yield clear lattice pictures.

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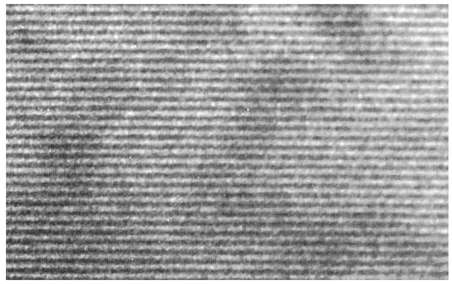
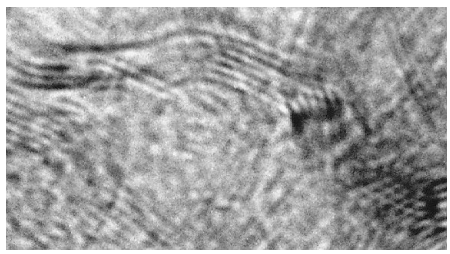


Product No. 629-1 **Copper Phthalocyanin**, Lattice plane spacing 1.03nm

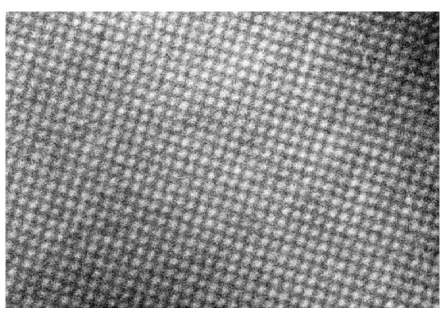
This compound has a useful wide crystal spacing. However, it is rather susceptible to radiation damage, and it is therefore advisable to take great care not to study a crystal too long before attempting to photograph it.

The electron optical magnification should not be over 100,000x, or the beam intensity required will be too high. The lattice plane spacings lie parallel with the long axis of the crystals.



Product No. 645 **Graphitized Carbon Black**, Lattice spacing 0.34nm

These graphitized carbon black particles have lattice planes following the contours of the particles. For a good test of the instrument, choose a field of view where the lattice planes run in several different directions.



Product No. 646 **Orientated Gold Crystals,** Lattice spacing 0.204nm, 0.143nm, and 0.102nm

The approximately 11nm thick evaporated gold is induced to grow in a (100) orientation. This gives lattice plane spacings of 0.204nm for the (200) planes and 0.143nm for the (220) planes. If the crystal thickness happens to be suitable, and if the objective aperture is large enough to accept the required diffraction beams, a spacing of 0.102nm can be imaged with a suitable focal setting. This specimen thus provides a valuable test for the best microscopes in service.

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