**MICROSCOPES**

**An overview of terminology**

Those of you who already know this information, please excuse this digression. There are many who don’t!

The **Magnification factor** is calculated by multiplying the power of the eyepiece by the power of the objective. Our standard microscopes come with 10x eyepieces and objectives of 4x, 10x, 40x, and 100x. This yields magnifications of 40x, 100x, 400x, and 1000x. For most wastewater organisms, you will be working at 400x and 1000x.

**Planachromatic Objectives** (otherwise known as “flat-field” objectives) are designed to give uniform focusing over the entire field of view. Did you ever notice that with a cheap microscope, when you bring the center of the field into focus, the edges are blurred, and if you bring the edges into focus, the center is blurred? You probably won't notice this at 40x or 100x, but it becomes apparent at 400x and 1000x. The opposite of planachromatic is achromatic, which sounds impressive, but is undesirable at higher powers.

The **Phase Contrast** option is attached beneath the stage, between the light source and the slide. It functions by shining part of the light directly through the slide, while the rest of the light is diverted, reflected, and then passed through the slide, causing the object on the slide to be illuminated by light at different parts of the wavelength. This has the effect of giving some “depth” to the object viewed, although it cannot be considered 3-D. Using phase contrast helps identify certain organisms and, in some cases, eliminates the need for staining.

**Brightfield** refers to a microscope without phase contrast, or one with the phase contrast attachment removed.

**Oil Immersion** is usually used at 1000x. The oil eliminates interferences at high power by eliminating the air space between the slide cover and the objective. It REALLY makes a difference at 1000x. This is how you do it:

1. Place the slide on the stage
2. Place the sample on the slide
3. Place a slide cover over the sample
4. Place a drop of immersion oil on top of the slide cover
5. Looking closely at the 100x objective and the slide cover (not through the eyepieces), slowly bring the objective down until it touches the drop of oil, but stop before the objective hits the slide cover.
6. Look through the eyepieces and bring into focus using the FINE adjustment.

**Some important tips**

☞ Always use a slide cover. This protects the objectives.

☞ For easy focusing, bring the image into focus using the lowest power objective, then switch to the next higher power. Repeat as necessary for higher powers.

☞ Keep your microscope covered when not in use. Cleaning eyepieces and objectives is not fun.
Affordable Wastewater Microscopes

These microscopes have superior optical quality and better software, which interfaces with your PC or laptop via a USB cable. The phase contrast eliminates the need to stain for many (but not all) organisms.

Toni Glymph, a nationally-known Wastewater Microbiologist and author, approves of these microscopes and states:

“These microscopes are a great tool at an excellent price!”

PLEASE NOTE:
It is impossible to specify the optical quality required with words. We guarantee that with these microscopes, you will not only see what you need to see, but also that you will be happy with the image quality, even at 1000x.
MICROSCOPES

BASIC BIOLOGICAL MICROSCOPE

Designed for ease of use and longevity. Improvements in both optical and mechanical features provide a new standard of quality for a crisp and clear image. Features include:

- Binocular with 30º inclined head and 360º rotation
- Widefield high eyepoint 10x eyepieces w/diopter adjustment on both eyepieces and rubber eyecups provide a 20 mm viewing area
- Planachromatic objectives EF-N PL 4x, 10x, 40x, 100x
- Coarse and fine focusing adjustment
- Built-in mechanical stage with right hand control
- Focusable Abbe condenser N.A. 1.25 with iris diaphragm and slot
- 45 mm blue filter, immersion oil, power cord, vinyl dust cover
- Built-in halogen illumination 6 V/30 w with intensity control
- Universal power supply 100-240 V

This is a basic optical microscope without phase contrast or photographic capabilities.

MC-210 995.00/ea

MOTICAM 580 DIGITAL SCREEN

Fully integrated documentation station specifically designated to enhance Motic microscopes without a digital head. With a 10” monitor built onto the camera’s arm, you can share the microscope’s image on the screen in real time. Can capture stills or video images onto an SD card using the supplied remote or capture button. Also includes USB and A/V port.

Specifications:
- Sensor Resolution: 5.0MP
- Output Possibilities: HDMI, Analog Video, USB, SD Card
- Recording Possibilities: 1080p Video, 5.0MP onto SD Card
- Software Included: Motic Images Plus for PC and MAC
- Fits standard Motic BA210 (NCL# MC-210), BA310, BA410 models

MC-580 1499.00/ea
DIGITAL BASIC BIOLOGICAL MICROSCOPE

This is the digital version of the **MC-210** microscope. It comes equipped with a built-in digital live high resolution imaging chip. Also included are a USB cable and software for your PC. Features include:

- Binocular with 30° inclined head and 360° rotation
- Widefield high eyepoint 10x eyepieces with diopter focus adjustment on both eyepieces and rubber eyecups provide a 20 mm viewing area
- 55-75 mm interpupillary distance
- Built-in digital live Hi-Res Imaging head
- 2048 x 1536 Resolution USB 2.0
- Planachromatic objectives EF-N PL 4x, 10x, 40x, 100x
- Capacity of up to 4 objectives
- Coarse and fine focusing adjustment
- Built-in mechanical stage with right hand control
- Focusable Abbe condenser N.A. 1.25 with iris diaphragm and slot
- 45 mm blue filter, immersion oil, power cord, vinyl dust cover
- Built-in halogen illumination 6 V/30 w with intensity control
- Universal power supply 100-240 V
- Motic Images Plus 2.0 for PC (WIN 2000 or higher)
- Motic Images Plus 2.0 for Mac (OSX or higher)
- Calibration slide

**MC-222D** 1955.00/ea
DIGITAL BRIGHTFIELD MICROSCOPE

- Binocular with ergonomic 30º viewing angle 360º rotation
- Widefield high eyepoint 10x eyepieces with diopter (focus) adjustment on both eyepieces and rubber eyecups provide a 20 mm viewing area
- 55-75 mm interpupillary distance
- Built-in digital live Hi-Res imaging chip
- 2048 x 1536 Resolution USB 2.0
- Planachromatic objectives EF-N PL 4x, 10x, 40x, 100x
- Use up to 5 objectives
- Coarse and fine focusing adjustment
- Built-in low position mechanical stage with right hand control, travel range of 76 x 50 mm
- Stage has a hard coated surface, resistant against abrasion and most lab chemicals
- Focusable Abbe condenser N.A. 0.9 with iris diaphragm and slot
- 45 mm blue filter, immersion oil, power cord, vinyl dust cover
- Built-in Koehler halogen illumination 6 V/30 w with intensity control
- Universal power supply 100-240 V
- Motic Images Plus 2.0 for PC (Win 2000 or higher)
- Motic Images Plus 2.0 for Mac (OSX or higher)
- Calibration Slide

MC-333D  2415.00/ea

DIGITAL PHASE CONTRAST MICROSCOPE

Same as above and also includes the following phase contrast equipment:
- 10x, 40x, 100x Plan Phase Objectives
- Phase contrast 5 position turret condenser (BF, 10x, 40x, 100x)
- Centering telescope

MP-350  3745.00/ea

ACCESSORIES

Reticles for Eyepiece:

<table>
<thead>
<tr>
<th>Micrometer, 100 divisions in 10 mm, 25 mm dia.</th>
<th>MC-372  44.00/ea</th>
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<tbody>
<tr>
<td>Cross line, 25 mm dia.</td>
<td>MC-371  44.00/ea</td>
</tr>
<tr>
<td>Cross line w/Micrometer, 25 mm dia.</td>
<td>MC-373  44.00/ea</td>
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<tr>
<td>Replacement quartz halogen lamp 6 V/30 w</td>
<td>MC-376  17.00/ea</td>
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</table>
MICROSCOPES

EMPLOYING THE STEREOSCOPIC OPTICAL SYSTEM

The SMZ-161 series stereomicroscopes provide you with a large-scale zoom ratio and the clearest image, high distortion-free and depth of field as well. SMZ-161 offers the best performance of a zoom ratio with 1:6, high resolution and long working distance.

SMZ-161 displays sharp, three-dimensioned images and wide field of view. Designed with eye point of 367 mm and a comfortable viewing angle of 45°, which meets the ergonomic requirements, the SMZ-161 enables prolonged hours of viewing without discomfort felt by neck and shoulder.

The SMZ161 zoom stereo microscopes are on a compact post stand with top and bottom illumination.

- Objective Lenses: 0.75x - 4.5x zoom built-in objective provides continuous magnification. Zoom ratio of 1:6. Viewing head rotates 360°.

- Eyepieces: Includes a pair of widefield 10x eyepieces, FN20. Additionally choose from optional paired widefield 10x (FN23), 15x (FN16), or 20x (FN13) eyepieces that are 45° inclined, with dual diopter adjustments, and interpupillary adjustment from 50 mm to 75 mm. Available in binocular or trinocular.

- Total Magnification: Zoom range with 10x eyepieces - 7.5x - 45x Stand: Post stand has top and bottom halogen illumination built-in.

- Working Distance: 110 mm

- Focusing: Large dual focusing knobs with slip clutch to prevent damage to mechanism. Tension adjustment eliminates focus ‘drift’.

- Illumination: Includes built-in 12 V/10 w halogen top light and 12 V/20 w halogen bottom light. Both have their own intensity control and on/off switch. UL Certified 100 V~240 V.

- Warranty: 5-year warranty.

SMZ-101 849.00/ea
WASTEWATER MICROBIOLOGY: A HANDBOOK FOR OPERATORS
By: Toni Glymph

Wastewater treatment is a microbiological process. Microorganisms, such as bacteria and protozoa, do the actual breakdown and removal of nutrients and organic material in wastewater. A wastewater treatment plant operator’s job is to control this biological process. That is why wastewater operators need to understand basic microbiology as well as the types of microorganisms that are used in the treatment of sewage and how the microbes do their job in the wastewater treatment process. Chapters cover wastewater treatment, general microscopy, bacteria, protozoa, metazoans, filamentous bacteria, microbiology, and process control. Includes a glossary of terms and color photographs of microorganisms on a CD-ROM.

Published by AWWA, ©2005, softbound, 182 pages.

BK-301 95.00/ea

A WASTEWATER MICROBIOLOGY LABORATORY MANUAL FOR OPERATORS
By: Toni Glymph

This book can be used as a practical guide and reference to assist operators in developing simple procedures for incorporating microbiological observations into their everyday process control program. Includes a DVD of live video clips along with color images of many of the microorganisms and procedures as mentioned in the book.

BK-305 65.00/ea
MICROSCOPE SUPPLIES

MICROSCOPE SLIDES
Glass, 3” x 1”, 72 per box.

<table>
<thead>
<tr>
<th>Type</th>
<th>NCL #</th>
<th>Price/box</th>
<th>Price/cs</th>
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<tbody>
<tr>
<td>Plain</td>
<td>M-201</td>
<td>6.00/72</td>
<td>99.00/20 box</td>
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<tr>
<td>Frosted, 1 side</td>
<td>M-201F</td>
<td>7.00/72</td>
<td>115.00/20 box</td>
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CONCAVITY SLIDES
Made of good quality glass sheet 1.2 mm thick, with ground edges, and spherical concavities. Available with single or double concavities, in packages of 12.

<table>
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<th>Description</th>
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<tr>
<td>3” x 1” slides, 1 concavity</td>
<td>CS-111</td>
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<tr>
<td>3” x 1” slides, 2 concavities</td>
<td>CS-211</td>
<td>10.00</td>
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MICROSCOPE SLIDE LABELS
Labels fit 1” x 3” (25 x 75 mm) standard microscope slide. Labels are \(\frac{15}{16}\) “ x \(\frac{15}{16}\)” with slightly rounded corners. White, die-cut, self-adhesive, 1000 per roll.

| LS-150 | 19.75/rl |

SLIDE HOLDER
With this handy file near your microscope, slides are always separated, visible, and orderly. The 12-place plastic holder allows slides to project over the rack’s edge for easy handling. 3\(\frac{3}{8}\)” x 7” x 3\(\frac{3}{4}\)” high.

| M-225 | 7.85/ea | 42.20/box of 6 |

MICROSCOPE SLIDE STORAGE BOX
Polyethylene storage box accommodates 100 of the 3” x 1” slides. Bottom is ribbed and slots are numbered. Printed index in cover.

| M-250 | 32.40/ea |

COVERS
Glass cover slips, 1 oz. per box. Counts per box are approximate. Most people use the No. 1, 22 x 22 mm, but we have other sizes.

<table>
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<th>Type</th>
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<tr>
<td>No. 1</td>
<td>22 mm x 22 mm</td>
<td>M-211</td>
<td>18.80/160</td>
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<tr>
<td>No. 1</td>
<td>24 mm x 40 mm</td>
<td>M-214</td>
<td>18.80/88</td>
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<tr>
<td>No. 1</td>
<td>24 mm x 50 mm</td>
<td>M-215</td>
<td>18.80/65</td>
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<tr>
<td>No. 1</td>
<td>24 mm x 60 mm</td>
<td>M-216</td>
<td>26.35/52</td>
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<tr>
<td>No. 1(\frac{1}{2})</td>
<td>22 mm x 22 mm</td>
<td>M-211A</td>
<td>18.80/135</td>
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</table>
IMMERSION OIL
Low viscosity for oil-immersion applications. Applicator bottle contains 5 ml.
M-220 7.80/ea

MICROSCOPE CLEANING KIT
For cleaning all microscope components. Removes dust, oils and other contaminants which can cause cloudiness, lack of contrast, decreased definition, etc. Contains 10 pre-saturated optic and lens cleaning pads, 2 individually wrapped packs of anti-static plastic surface wipes, 2 pre-moistened 6" germicide swabs, and instructions.
MT-101 89.60/kit

STAIN SETS
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<th>Stain Set</th>
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<tbody>
<tr>
<td>GRAM’S STAIN SET</td>
<td>DF-3328</td>
<td>55.94/ea</td>
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<tr>
<td>NEISSER STAIN SET</td>
<td>NE-3</td>
<td>38.00/set</td>
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<tr>
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<td>INDIA INK</td>
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<tr>
<td>2.5 ml plastic dropper bottles</td>
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