VISION-EASE LENS
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Technical Services Department

Technical Tip

Chemical Hardening

Important basics in chemical hardening:

- **Safety: Practice extreme caution when working with hot materials.**
- **Clean:** Lens must be absolutely free of contamination.
- **Dry:** No moisture should be present on lenses or racks.
- **Document:** Maintenance and number of lenses processed- per cycle.
- **Correct bath:** Be sure lenses are compatible with salts.

Sixteen hour cycles (normal):

- Crown and tinted crown are to be hardened in a 99.5% potassium nitrate (KNO_3)/0.5% silicic acid (H_2SiO_3) bath at 450°C.
- Photochromic lenses are to be hardened in a 59.7% potassium nitrate/39.8% sodium nitrate($NaNO_3$)/ 0.5% silicic acid bath at 400°C.
- All lenses require up to 15 minutes pre-warming and 15 minutes cool-down adjoining hardening cycle. Pre/post soak cycles are often preset on most equipment and will gradually warm and cool lenses to about 320°C, avoiding thermal shock and breakage. Do not extend the 15 minutes time.
- A weekend cycle of 64 hours is only minimally less impact resistant than 16 hours.

Two hour hardening cycles :

- Lenses must photochromic.
- Bath is to be mixed: 99.5% potassium nitrate/ 0.5% silicic acid, at 450°C.
- Maximum time lenses can be in bath is 18 hours, where impact strength lessens.
- Crown and fixed tint lenses will weaken by lithium ions within bath from photochromic lenses.

Impact testing:

- It is the responsibility of the operator to assure that all lenses meet the industry guidelines of impact resistance through FDA Drop-ball Testing.
- Documentation is extremely important.

See “Tips for Maximum Efficiency” (Next Page)

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Technical Tip

Chemical Hardening (Continued)

Tips for maximum efficiency:

- Bath should be entirely changed when counter-ion rate of 2% is reached, or pH raises too high. Bath quality can be evaluated by testing kits available through many equipment suppliers. When damage is seen on lenses, it is probably time to change the salts!
- After changing bath salts, a period of twenty-four hours at operating temperature is required for a break-in period and prior to adding any lenses. Temperatures must be consistently accurate +/- 5.0°C.
- A salt bath can be extended by daily removing a scoop of sediment from the tank bottom. Replace with an equal amount of fresh chemicals several hours before operating the next cycle. Silicic acid should only be added when hardened lenses become looking “splotchy”.
- Check temperatures and cycle timing weekly. Measure temperature in all areas of the tank, including at all four corners, bottom, top and middle positions. Document any changes.
- High Index materials of 1.6 and 1.7 are best subjected to baths at about 530°C.
- Lenses must be absolutely clean and dry before chemical hardening.
- Ideal bath temperatures for 16 hour cycle with common materials:

Crown, White 455°C	1.6 Index 557°C
Crown, Pink 447°C	1.7 Index 533°C
Crown, Tan 423°C	1.8 Index 538°C
Photochromic 400°C	(not recommended)

- Some stains/spots are normal; lenses may be buffed after hardening with cerium oxide.
- If excessive staining or damage is observed, check temperatures or change salts.

For any additional technical questions, call the toll-free Technical Services Hotline: (800) 367-2544 ext. 5301
You can also send messages to us via e-mail: techservices@vision-ease.com
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