

## New Photographic Plates made in Russia for Astronomical Observations

Although during the past few years astronomers have often made use of CCD-detectors for observations of weak celestial bodies, this does not mean that photography is no longer of great use in astronomy. On the contrary, it is unsurpassed for wide-field applications.

During the past four years the JSC 'Slavich' has produced plates of type NT-1A for astronomical observations with long exposure times. New technology has been used for manufacturing these plates: special emulsion, polished glass with thickness 1.7 or 2.6 mm and improved coating. The plates have an antihalation layer. The special emulsion contains quasi-T AgBr-crystals, the ratio of the diameter to their thickness being equal from 3 to 5. After chemical-photographic treatment the sizes of the grains are equal approximately to 1.1 mkm.

Immediately after making the plates NT-1A have low sensitivity and they may be kept at room temperature for a long time. Before use, the plates must be hypersensitized by hydrogen soaking. The hydrogen hypersensitization reduces photographic reciprocity law failure and the sensitivity grows significantly, especially for long exposure times (Brejdo et al. 1993). After hypersensitization the plates must be preserved at low temperature, and then their safety is equal to 2-3 months (Michailova 1989).

The results of comparative laboratory tests of plates NT-1A, Kodak 103a-O and ORWO ZU-21 are given in the Table. There are: sensitivity (Speed) S (for density  $D = 0.2$  above fog) for several exposure times; Contrast G (gamma); Resolving power R; and Minimal threshold contrast K. The last evaluates the ability of photographic material to record the faintest stars on the night sky background (Brejdo 1980). The value of K is very important for astronomers. The smaller it is the fainter the stars (with optimal exposure) that can be recorded (Brejdo & Michailova 1975).

Plates	t exp.	S				G	R	K
		10s	100s	10m	50m			
'Slavich' NT-1A		60	50	45	40	2.0	120	0.15
Kodak 103a-O		75	50	45	40	1.8	100	0.3
ORWO ZU-21		55	45	35	30	1.7	90	0.2

One can see that sensitivity is approximately equal for all these plates, but Resolving power R and Minimal threshold contrast K is better for plates NT-1A than for Kodak 103a-O and ORWO ZU-21.

The laboratory tests show also that the spectral sensitivities of all these plates coincide. JSC 'Slavich' intends to develop ortho and panchromatic plates also.

Since 1991 the plates NT-1A have been used for the photographic observations with the normal astrograph at Pulkovo Observatory (sizes of plates 16 x 16 cm). In 1991 plates were taken of the Coma cluster with exposure time 20 min: 3 plates on NT-1A and 3 plates on ORWO ZU-21. The photometric measurements showed that the limiting magnitudes of stars were the same for all plates.

The observations of Pluto were fulfilled in 1991-1993 with exposure time 30 min and of the Pleiades cluster with exposure time 10 min. In 1993, 6 plates were taken of radiosources. On plates with the Pleiades the improvement in limiting magnitude is 0.5 in comparison with ORWO ZU-21. The images of stars and Pluto are more sharp on the plates NT-1A, than on ORWO ZU-21.

## Conclusion

The plates NT-1A are well suitable for astrometric work. After hydrogen hypersensitization they can be preserved for 2-3 months in the refrigerator. The unhyposensitized plates can be kept for a long time at room temperatures.

## References

- Brejdo, I.I., 1980. *Zhurn. nauch. i prikl.fotogr. i kinematogr.*, **25**, 285. (In Russian).  
Brejdo, I.I. and Michailova, O.M., 1975. *Zhurn. nauch. i prikl.fotogr. i kinematogr.*, **20**, 113. (In Russian).  
Brejdo, I.I., Michailova, O.M. and Yudin, R.V., 1993. *Astron. Tsirkular* N 1285. (In Russian).  
Michailova, O.M., 1989. *Izvestia GAO (Pulkovo)*, N 206, 84. (In Russian).

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