



Revised: November 6, 2023

Product Information: Amino-Modified ATTO-Labels

Compound	Storage information	Shelf Life
Amino-modified fluorescent label Lyophilized or crystalline solid	Freeze upon receipt < -20 °C Protect from light and moisture	When stored as indicated, amino-modified ATTO-labels are stable for at least 3 years.
For optical properties see table on page 2.		

Introduction:

Labels with an amine moiety can be used for coupling to carboxy groups via a mild in-situ activation or by direct coupling to succinimidyl esters, TFP-esters or mixed anhydrides.

Storage and Handling:

ATTO amino-modified labels are generally supplied as dry, crystalline solids and should be stored at < -20 °C, desiccated and protected from light. When stored as indicated, the product is stable for at least three years.

For the preparation of stock solutions we recommend to dissolve the dye (1 mg unit) in 200 – 500 µl of dry DMSO or DMF - for ATTO MB2 use acetonitrile. Stock solutions should be stored at -20 °C and protected from light.

Note: Depending on solvent quality the shelf-life of such solutions might be significantly reduced compared to the dye in its solid form.

Labeling with Amino-Modified ATTO-Labels:

The reactivity of an amine strongly depends on its basicity. All amino-modified ATTO-labels are aliphatic amines. The concentration of the reactive, free base (-NH₂) of aliphatic amines below pH 8 is very low. Thus, the reaction kinetics of amine acylation by succinimidyl esters or other reagents is strongly pH dependent. Therefore, coupling reactions should be performed at pH 8.5 or higher.

ATTO amino-modified labels are provided as ammonium salts. Due to the risk of hydrolysis of e.g. succinimidyl esters or anhydrides in aqueous solution it is, whenever possible, advantageous to work in anhydrous organic solvents (DMF or DMSO) and to add 1.5 – 2 eq. of N,N-diisopropylethylamine (Hünigs base), to ensure a sufficiently high concentration of free amine (-NH₂) for the reaction to take place.

References:

1. Koner A.L.; Krndija, D. et al., *Hydroxy-Terminated Conjugated Polymer Nanoparticles Have Near-Unity Bright Fraction and Reveal Cholesterol-Dependence of IGF1R Nanodomains*, ACS Nano **7** (2013), 1137-1144.
2. Lai, C.-H.; Hütter, J. et al., *Analysis of Carbohydrate-Carbohydrate Interactions Using Sugar-Functionalized Silicon Nanoparticles for Cell Imaging*. Nano letters **16** (2016), 807-811.

Table: Properties of amino-modified **ATTO**-labels:

Dye	Order #		MW	M ⁺	λ_{abs}	λ_{em}	ϵ_{max}	CF ₂₆₀	CF ₂₈₀
	1 mg	5 mg							
ATTO 390	AD 390-91	AD 390-95	500	386	390	476	24000	0.46	0.09
ATTO 425	AD 425-91	AD 425-95	558	444	439	485	45000	0.19	0.17
ATTO 465	AD 465-91	AD 465-95	565	338	453	506	75000	1.09	0.48
ATTO 488	AD 488-91	AD 488-95	860	632	500	520	90000	0.22	0.09
ATTO 495	AD 495-91	AD 495-95	625	395	498	526	80000	0.45	0.37
ATTO 514	AD 514-91	AD 514-95	1024	796	511	532	115000	0.21	0.07
ATTO 520	AD 520-91	AD 520-95	609	409	517	538	110000	0.16	0.20
ATTO 532	AD 532-91	AD 532-95	916	688	532	552	115000	0.20	0.09
ATTO Rho6G	AD Rho6G-91	AD Rho6G-95	784	556	533	557	115000	0.19	0.16
ATTO 550	AD 550-91	AD 550-95	864	636	554	576	120000	0.23	0.10
ATTO 565	AD 565-91	AD 565-95	781	553	564	590	120000	0.27	0.12
ATTO 590	AD 590-91	AD 590-95	917	689	593	622	120000	0.39	0.43
ATTO 594	AD 594-91	AD 594-95	1076	848	603	626	120000	0.22	0.50
ATTO 633	AD 633-91	AD 633-95	822	594	630	651	130000	0.04	0.05
ATTO 643	AD 643-91	AD 643-95	1106	878	643	665	150000	0.05	0.04
ATTO 647N	AD 647N-91	AD 647N-95	889	688	646	664	150000	0.04	0.03
ATTO 655	AD 655-91	AD 655-95	798	570	663	680	125000	0.24	0.08
ATTO 680	AD 680-91	AD 680-95	796	568	681	698	125000	0.30	0.17
ATTO 700	AD 700-91	AD 700-95	836	608	700	716	120000	0.26	0.41
ATTO MB2	AD MB2-91	AD MB2-95	626	400	668		100000	0.08	0.24

MW: molecular weight of the dye including counterions in g/mol; M⁺: molecular weight of dye cation (HPLC_MS acetonitrile/water 0.1 vol-% trifluoroacetic acid); λ_{abs} : longest wavelength absorption maximum in nm; λ_{em} : fluorescence maximum in nm; ϵ_{max} : molar decadic extinction coefficient at the longest-wavelength absorption maximum in M⁻¹ cm⁻¹; CF₂₆₀ = $\epsilon_{260}/\epsilon_{\text{max}}$; CF₂₈₀ = $\epsilon_{280}/\epsilon_{\text{max}}$;

Detailed information on each individual dye including risk and safety data can be downloaded from our website at www.atto-tec.com.

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ATTO-TEC products are high-quality reagents intended for research purposes only. These compounds must be used by, or under the direct supervision of, technically qualified individuals experienced in handling potentially hazardous chemicals. We refer to the **Material Safety Data Sheet (MSDS)** provided with each product.

Additional information on **ATTO-TEC** and its entire product range is available on our website www.atto-tec.com. For further questions contact us directly by e-mail or fax.