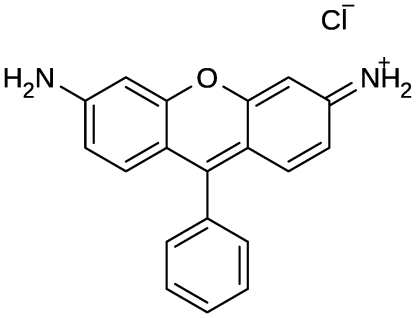
Rhodamine

Not to be confused with rhodanine.

Rhodamine /ˈroʊdəmiːn/ is a family of related chemical compounds, fluorone dyes. Examples are **Rhodamine 6G** and **Rhodamine B**. They are used as a dye and as a dye laser gain medium.[1][2] They are often used as a tracer dye within water to determine the rate and direction of flow and transport. Rhodamine dyes fluoresce and can thus be detected easily and inexpensively with instruments called fluorometers. Rhodamine dyes are used extensively in biotechnology applications such as fluorescence microscopy, flow cytometry, fluorescence correlation spectroscopy and ELISA.



Rhodamine core structure

Rhodamine dyes are generally toxic, and are soluble in water, methanol and ethanol.


Rhodamine in water.

Rhodamine B

Main article: Rhodamine B

Rhodamine 6G

Main article: Rhodamine 6G

Rhodamine 123

Main article: Rhodamine 123

The laser dye rhodamine 123 is also used in biochemistry to inhibit mitochondrion function. Rhodamine 123 seems to bind to the mitochondrion membranes and inhibit transport processes, especially the electron transport chain, thus slowing down inner respiration. It is a substrate of P-glycoprotein (Pgp), which is usually overexpressed in cancer cells. Recent reports indicate that rhodamine 123 may be also a substrate of multidrug resistance-associated protein (MRP), or more specifically, MRP1.

Other rhodamine derivatives

There are many rhodamine derivatives used for imaging purposes, for example Carboxytetramethylrhodamine (TAMRA), tetramethylrhodamine (TMR) and its isothiocyanate derivative (TRITC) and, sulforhodamine 101 (and its sulfonyl chloride form Texas Red) and Rhodamine Red. TRITC is the base rhodamine molecule functionalized with an isothiocyanate group (**-N=C=S**), replacing a hydrogen atom on the bottom ring of the structure. This derivative is reactive towards amine groups on proteins inside cells. A succinimidyl-ester functional group attached to the rhodamine core, creating NHS-rhodamine, forms another common amine-reactive derivative.

Other derivatives of rhodamine include newer fluorophores such as Alexa 546, Alexa 555, Alexa 633, DyLight 550 and DyLight 633, have been tailored for various chemical and biological applications where higher photostability, increased brightness, different spectral characteristics, or different attachment groups are needed.

References

[1] F. P. Schäfer (Ed.), *Dye Lasers*, 3rd Ed. (Springer-Verlag, Berlin, 1990).
[2] F. J. Duarte and L. W. Hillman (Eds.), *Dye Laser Principles* (Academic, New York, 1990).

External links

- Absorption and Emission Spectra of Rhodamine B (http://omlc.ogi.edu/spectra/PhotochemCAD/html/rhodamineB.html)
- Absorption and Emission Spectra of Rhodamine 6G (http://omlc.ogi.edu/spectra/PhotochemCAD/html/rhodamine6G.html)
- Absorption and Emission Spectra of Rhodamine 123 (http://omlc.ogi.edu/spectra/PhotochemCAD/html/rhodamine123.html)
- Berlier et al. 2003 J. Histochem Cytochem refers to Alexa 633 as a rhodamine derivative.

Article Sources and Contributors

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