

## Tide Quencher™ Dyes for FRET Applications

Although DABCYL has been used to develop a variety of FRET applications, its low quenching efficiency for longer wavelength dyes (such as fluoresceins, rhodamines and cyanines) has limited its use in the development of sensitive FRET probes. AAT Bioquest has developed the robust Tide Quencher™ acceptor dyes for development of longer wavelength FRET probes. These Tide Quencher™ dark FRET acceptors are optimized to pair with our bright Tide Fluor™ dyes and the classic fluorophores (such as EDANS, FAM, TAMRA, HEX, JOE, TET, ROX, Cy3, Cy5 and Cy7). Like our Tide Fluor™ donors dyes, our Tide Quencher™ acceptor dyes are much more cost-effective with comparable or even better performance for your desired biological applications than the other commercial products on the market.

Dark FRET Acceptor	$\lambda_{\max}$ (nm)	Features and Benefits	Ordering Information
Tide Quencher™ 1 (TQ1)	510	<i>Alternative to Dabcyl, QSY® 35 and BHQ®-0</i> <ul style="list-style-type: none"> <li>Best paired with Tide Fluor™ 1 (TF1)</li> <li>Excellent FRET efficiency with coumarins</li> </ul>	#2188 & #2189 (Click chemistry) #2190 (TQ1 acid); #2192 (TQ1 amine) #2193 & #2194 (TQ1 CPG, OH-reactive) #2196 (TQ1 maleimide, SH-reactive) #2198 (TQ1 phosphoramidite, OH-reactive) #2199 (TQ1 SE, NH <sub>2</sub> -reactive)
Tide Quencher™ 2 (TQ2)	531	<i>Alternative to BHQ®-1</i> <ul style="list-style-type: none"> <li>Best paired with Tide Fluor™ 2 (TF2)</li> <li>Better matched with FAM, FITC and Alexa Fluor® 488 than other commercial quenchers</li> </ul>	#2211 & #2212 (Click chemistry) #2200 (TQ2 acid); #2202 (TQ2 amine) #2203 & #2204 (TQ2 CPG, OH-reactive) #2206 (TQ2 maleimide, SH-reactive) #2208 (TQ2 phosphoramidite, OH-reactive) #2210 (TQ2 SE, NH <sub>2</sub> -reactive)
Tide Quencher™ 2WS (TQ2WS)	539	<i>Alternative to BHQ®-1 &amp; QXL 520</i> <ul style="list-style-type: none"> <li>Better matched with FAM, FITC and Alexa Fluor® 488 than other commercial quenchers</li> </ul>	#2050 (TQ2WS acid) #2058 (TQ2WS, SE, NH <sub>2</sub> -reactive)
Tide Quencher™ 3 (TQ3)	598	<i>Alternative to QSY® 7, QSY® 9 and BHQ®-2</i> <ul style="list-style-type: none"> <li>Best paired with Tide Fluor™ 3 (TF3)</li> <li>Excellent FRET efficiency with Cy3®, Alexa Fluor® 555 and TAMRA than other commercial quenchers</li> </ul>	#2220 (TQ3 acid); #2222 (TQ3 amine) #2223 & #2224 (TQ3 CPG, OH-reactive) #2226 (TQ3 maleimide, SH-reactive) #2228 (TQ3 phosphoramidite, OH-reactive) #2230 (TQ3 SE, NH <sub>2</sub> -reactive) #2231 & #2232 (Click chemistry)
Tide Quencher™ 3WS (TQ3WS)	576	<i>Alternative to QSY® 7, QSY® 9 and BHQ®-2</i> <ul style="list-style-type: none"> <li>Excellent FRET efficiency with Cy3®, Alexa Fluor® 555 and TAMRA than other commercial quenchers</li> </ul>	#2227 (TQ3WS acid) #2229 (TQ3WS SE, NH <sub>2</sub> -reactive)
Tide Quencher™ 4 (TQ4)	647	<i>Alternative to QSY® 21 and BHQ®-3</i> <ul style="list-style-type: none"> <li>Better FRET efficiency with ROX, Texas Red® and Alexa Fluor® 594 than other commercial quenchers</li> </ul>	#2062 & #2063 (TQ4 CPG, OH-reactive)
Tide Quencher™ 4WS (TQ4WS)	601	<i>Alternative to QSY® 21 and BHQ®-3</i> <ul style="list-style-type: none"> <li>Best paired with Tide Fluor™ 4 (TF4)</li> <li>Better FRET efficiency with ROX, Texas Red® and Alexa Fluor® 594 than other commercial quenchers</li> </ul>	#2060 (TQ4WS acid); #2061 (TQ4WS amine) #2064 (TQ4WS maleimide, SH-reactive) #2067 (TQ4WS SE, NH <sub>2</sub> -reactive) #2068 & #2069 (Click chemistry)
Tide Quencher™ 5 (TQ5)	680	<i>Alternative to QSY® 21 and BHQ®-3</i> <ul style="list-style-type: none"> <li>Better FRET efficiency with ROX, Texas Red® and Alexa Fluor® 594 than other commercial quenchers</li> </ul>	#2077 & #2078 (TQ5 CPG, OH-reactive)
Tide Quencher™ 5WS (TQ5WS)	662	<i>Alternative to QSY® 21 and BHQ®-3</i> <ul style="list-style-type: none"> <li>Best paired with Tide Fluor™ 5 (TF5)</li> <li>Excellent FRET efficiency with Cy5®, DyLight™ 649 and Alexa Fluor® 647.</li> </ul>	#2075 (TQ5WS acid); #2076 (TQ4WS amine) #2079 (TQ5WS maleimide, SH-reactive) #2081 (TQ5WS SE, NH <sub>2</sub> -reactive) #2082 & #2083 (Click chemistry)
Tide Quencher™ 6WS (TQ6WS)	702	<ul style="list-style-type: none"> <li>Stronger absorption</li> <li>Best paired with Tide Fluor™ 6 (TF6)</li> <li>Better FRET efficiency with Cy5.5®, IRDye® 700 and Alexa Fluor® 680 than other commercial quenchers</li> </ul>	#2090 (TQ6WS acid); #2091 (TQ6WS amine) #2094 (TQ6WS maleimide, SH-reactive) #2096 (TQ6WS SE, NH <sub>2</sub> -reactive) #2097 & #2098 (Click chemistry)
Tide Quencher™ 7WS (TQ7WS)	763	<ul style="list-style-type: none"> <li>Stronger absorption</li> <li>Best paired with Tide Fluor™ 7 (TF7)</li> <li>Better FRET efficiency with Cy7® and Alexa Fluor® 750 than other commercial quenchers</li> </ul>	#2105 (TQ7WS acid); #2106 (TQ7WS amine) #2109 (TQ7WS maleimide, SH-reactive) #2111 (TQ7WS SE, NH <sub>2</sub> -reactive) #2112 & #2113 (Click chemistry)

Notes: BHQ is the trademark of Biosearch Technologies, Inc. Texas Red®, QSY® and Alexa Fluor® are the trademarks of Molecular Probes. CyDye, Cy3®, Cy5®, Cy5.5® and Cy7® are the trademarks of GE Health Care. DyLight™ is the trademark of ThermoFisher Corp. IRDye® 700 and IRDye® 800 are the trademarks of Li-COR. Tide Quencher™ and Tide Quencher™ are the trademarks of AAT Bioquest.

## Chemical Properties of Tide Quencher™ Non-Fluorescent Labeling Dyes

AAT Bioquest offers a full set of Tide Quencher™ dyes that span the full visible spectrum. Tide Quencher™ dyes have improved labeling performance than the classic quencher dyes such as Dabcyl, Black Hole Quencher® and QSY® dyes. They can be readily used to develop various FRET probes for molecular diagnostics, proteomics and other biological applications.

Labeling Dye	Cat#	Product Description	Reactivity	Adduct MW Calculation*
TQ1	2188	Tide Quencher™ 1 azide [TQ1 azide]	Alkyne	+ 358
	2189	Tide Quencher™ 1 alkyne [TQ1 alkyne]	Azide	+ 327
	2190	Tide Quencher™ 1 acid [TQ1 acid]	NH <sub>2</sub> and OH	+ 272
	2192	Tide Quencher™ 1 amine [TQ1 amine]	CO <sub>2</sub> H	+ 314
	2193 & 2194	Tide Quencher™ 1 CPG [TQ1 CPG]	Oligo Synthesis	+ 345
	2196	Tide Quencher™ 1 maleimide [TQ1 maleimide]	SH	+ 455
	2199	Tide Quencher™ 1 succinimidyl ester [TQ1 SE]	Aliphatic amine	+ 272
TQ2	2200	Tide Quencher™ 2 acid [TQ2 acid]	NH <sub>2</sub> and OH	+ 364
	2202	Tide Quencher™ 2 amine [TQ2 amine]	CO <sub>2</sub> H	+ 406
	2203 & 2204	Tide Quencher™ 2 CPG [TQ2 CPG]	Oligo Synthesis	+ 437
	2206	Tide Quencher™ 2 maleimide [TQ2 maleimide]	SH	+ 504
	2210	Tide Quencher™ 2 succinimidyl ester [TQ2 SE]	Aliphatic amine	+ 364
	2211	Tide Quencher™ 2 azide [TQ2 azide]	Alkyne	+ 450
	2212	Tide Quencher™ 2 alkyne [TQ2 alkyne]	Azide	+ 419
TQ2WS	2050	Tide Quencher™ 2WS acid [TQ2WS acid]	NH <sub>2</sub> and OH	+ 472
	2058	Tide Quencher™ 2WS succinimidyl ester [TQ2WS SE]	Aliphatic amine	+ 472
	2059	Tide Quencher™ 2WS maleimide [TQ2WS maleimide]	SH	+ 612
TQ3	2220	Tide Quencher™ 3 acid [TQ3 acid]	NH <sub>2</sub> and OH	+ 435
	2222	Tide Quencher™ 3 amine [TQ3 amine]	CO <sub>2</sub> H	+ 477
	2223 & 2224	Tide Quencher™ 3 CPG [TQ3 CPG]	Oligo Synthesis	+ 508
	2226	Tide Quencher™ 3 maleimide [TQ3 maleimide]	SH	+ 575
	2230	Tide Quencher™ 3 succinimidyl ester [TQ3 SE]	Aliphatic amine	+ 435
	2231	Tide Quencher™ 3 azide [TQ3 azide]	Alkyne	+ 521
	2232	Tide Quencher™ 3 alkyne [TQ3 alkyne]	Azide	+ 490
TQ3WS	2227	Tide Quencher™ 2 acid [TQ3WS acid]	NH <sub>2</sub> and OH	+ 779
	2229	Tide Quencher™ 2 succinimidyl ester [TQ3WS SE]	Aliphatic amine	+ 779
TQ4	2062 & 2063	Tide Quencher™ 4 CPG [TQ4 CPG]	Oligo Synthesis	+ 501
TQ4WS	2060	Tide Quencher™ 4WS acid [TQ4WS acid]	NH <sub>2</sub> and OH	+ 781
	2061	Tide Quencher™ 4WS amine [TQ4WS amine]	CO <sub>2</sub> H	+ 823
	2064	Tide Quencher™ 4WS maleimide [TQ4WS maleimide]	SH	+ 992
	2067	Tide Quencher™ 4WS succinimidyl ester [TQ4WS SE]	Aliphatic amine	+ 781
	2068	Tide Quencher™ 4WS azide [TQ4WS azide]	Alkyne	+ 887
	2069	Tide Quencher™ 4WS alkyne [TQ4WS alkyne]	Azide	+ 836
TQ5	2077 & 2078	Tide Quencher™ 5 CPG [TQ5 CPG]	Oligo Synthesis	+ 569

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TQ5WS	2075	Tide Quencher™ 5WS acid [TQ5WS acid]	NH <sub>2</sub> and OH	+ 758
	2076	Tide Quencher™ 5WS amine [TQ5WS amine]	CO <sub>2</sub> H	+ 799
	2079	Tide Quencher™ 5WS maleimide [TQ5WS maleimide]	SH	+ 968
	2081	Tide Quencher™ 5WS succinimidyl ester [TQ5WS SE]	Aliphatic amine	+ 758
	2082	Tide Quencher™ 5WS azide [TQ5WS azide]	Alkyne	+ 843
	2083	Tide Quencher™ 5WS alkyne [TQ5WS alkyne]	Azide	+ 812
TQ6WS	2090	Tide Quencher™ 6WS acid [TQ6WS acid]	NH <sub>2</sub> and OH	+ 806
	2091	Tide Quencher™ 6WS amine [TQ6WS amine]	CO <sub>2</sub> H	+ 848
	2094	Tide Quencher™ 6WS maleimide [TQ6WS maleimide]	SH	+ 1017
	2096	Tide Quencher™ 6WS succinimidyl ester [TQ6WS SE]	Aliphatic amine	+ 806
	2097	Tide Quencher™ 6WS azide [TQ6WS azide]	Alkyne	+ 892
	2098	Tide Quencher™ 6WS alkyne [TQ6WS alkyne]	Azide	+ 861
TQ7WS	2105	Tide Quencher™ 7WS acid [TQ7WS acid]	NH <sub>2</sub> and OH	+ 783
	2106	Tide Quencher™ 7WS amine [TQ7WS amine]	CO <sub>2</sub> H	+ 825
	2109	Tide Quencher™ 7WS maleimide [TQ7WS maleimide]	SH	+ 994
	2111	Tide Quencher™ 7WS succinimidyl ester [TQ7WS SE]	Aliphatic amine	+ 783
	2112	Tide Quencher™ 7WS azide [TQ7WS azide]	Alkyne	+ 869
	2113	Tide Quencher™ 7WS alkyne [TQ7WS alkyne]	Azide	+ 838

\* The molecular weight of the desired conjugate = the molecular weight of unlabeled molecule + the value listed in the table.

## Spectral Properties of Tide Quencher™ Non-Fluorescent Labeling Dyes

Tide Quencher™ dyes are a series of excellent labeling quenchers that span the full visible spectrum. Tide Quencher™ dyes have improved labeling performance than the classic quencher dyes such as Dabcyl, Black Hole Quencher® and QSY® dyes. They are the best affordable dyes for labeling oligos and peptides without compromised performance. Each Tide Quencher™ dye is developed to match the spectral properties of a particular fluorescent donor, e.g., Alexa Fluor® or other labeling dyes (such as DyLight™ dyes).

Labeling Dye	Extinction Coefficient <sup>1</sup> (cm <sup>-1</sup> M <sup>-1</sup> )	Abs (nm)	CF at 260 nm <sup>2</sup>	CF at 280 nm <sup>3</sup>
TQ1	20,000	510	0.147	0.194
TQ2	21,000	531	0.100	0.120
TQ2WS	21,000	531	0.100	0.120
TQ3	22,000	598	0.085	0.091
TQ3WS	90,000	576	0.186	0.205
TQ4	23,000	647	0.146	0.183
TQ4WS	90,000	601	0.149	0.136
TQ5	24,000	680	0.170	0.133
TQ5WS	130,000	662	0.072	0.082
TQ6WS	130,000	702	0.120	0.102
TQ7WS	140,000	763	0.072	0.091

Notes: 1. Extinction Coefficient at their maximum absorption wavelength; 2. CF at 260 nm is the correction factor used for eliminating the dye contribution to the absorbance at 260 nm (for oligo and nucleic acid labeling); 3. CF at 280 nm is the correction factor used for eliminating the dye contribution to the absorbance at 280 nm (for peptide and protein labeling).