



## Water Soluble Tetrazolium Salts (WSTs)

### WST-1,-3,-4,-5,-8,-9

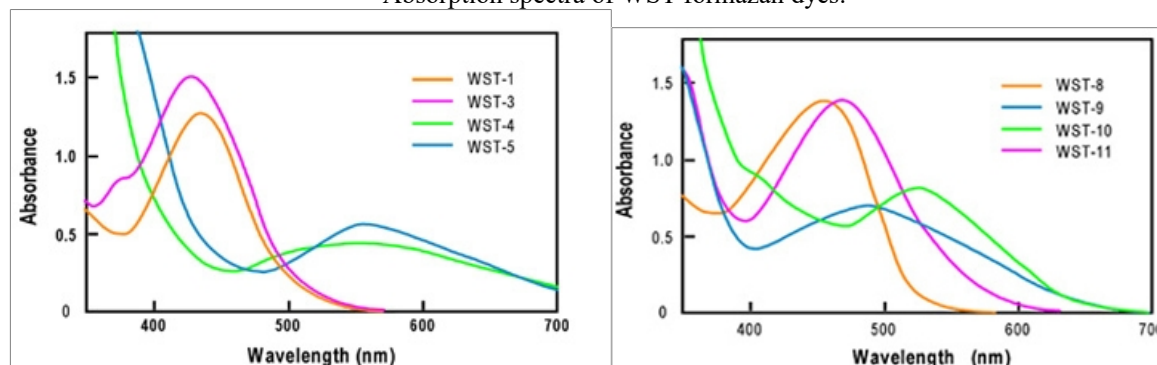
*Color changes when reduced. Useful for metabolism enzymatic assays, staining, cell viability monitoring and immunoassays in conjunction with an electron mediator.*

Water-soluble tetrazolium salts (WSTs) were developed by introducing positive or negative charges and hydroxy groups to the phenyl ring of the tetrazolium salt. Positive charges, such as trialkylammonio groups, improve the water-solubility of the formazan dye. However, a large cation is easily precipitated out with organic anions such as carboxylate or phosphate. Though a hydroxy group also improved the water-solubility of the tetrazolium salt, its corresponding formazan dye was not sufficiently water-soluble.

Following WSTs have sulfonate groups added directly or indirectly to the phenyl ring to improve water-solubility.

We also offer several newly developed phenylazo-type tetrazolium salts, which are easily reduced with NADH or other reducing agents to give orange or purple formazan dyes. Due to the phenylazo group, the color changes with heavy metal ion. Since the water solubility of WSTs are high, 10 mM to 100 mM solutions can be prepared.

Absorption spectra of WST formazan dyes:



*WST pure powders	MW	Molar absorptivity (tetrazolium)	Molar absorptivity (formazan)
WST-1 #F98880, 100mg	651.35	>21 600(244nm)	>37 000(438nm)
2-(4-Iodophenyl)-3-(4-nitrophenyl)-5-(2,4-disulfophenyl)-2H-tetrazolium			
WST-3 #T33230, 100mg	693.34	>36 000(234nm)	>30 000(433nm)
2-(4-Iodophenyl)-3-(2,4-dinitrophenyl)-5-(2,4-disulfophenyl)-2H-tetrazolium			
WST-4 #T33240, 100mg	580.95	>28 000(264nm)	>10 000(550nm)
WST-5 #T33250, 100mg	1331.35	>50 000(234nm)	>27 000(550nm)
WST-8 #QZ8430, 100mg	600.47		
2-(2-methoxy-4-nitrophenyl)-3-(4-nitrophenyl)-5-(2,4-disulfophenyl)-2H-tetrazolium			
WST-9 #BB4490, 100mg			

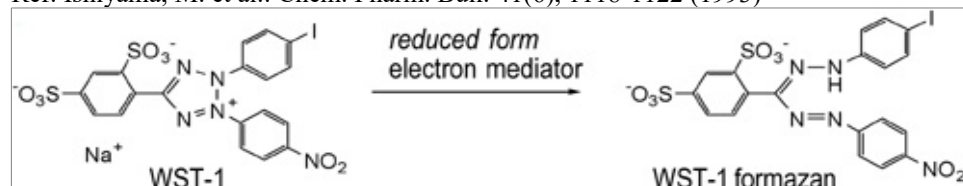
*Electron mediators	MW	Molar absorptivity	Molar absorptivity
1-Methoxy-PMS #T31990	336.36	>2 700 (505nm)	Soluble @34mg/100ml

Storage: store at 0-5°C (L) or -20°C for long term.

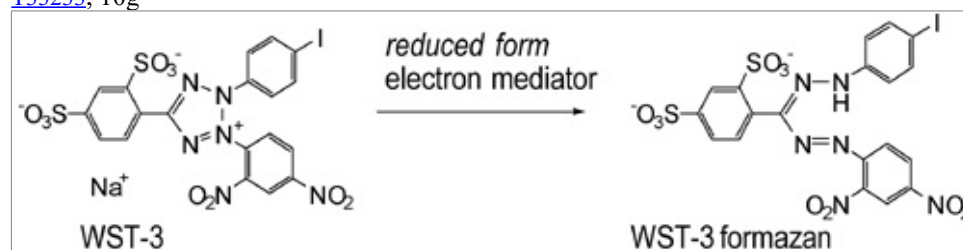
Catalog #:	Name / Features	
<a href="#">F98880</a> , 100mg	<b>WST-1</b>	$\lambda_{\max}$ (formazan): 438nm
<a href="#">F98881</a> , 500mg	2-(4-Iodophenyl)-3-(4-nitrophenyl)-5-(2,4-disulfofophenyl)-2H-tetrazolium,	EC: 21 600(244nm)
<a href="#">F98884</a> , 1g	monosodium salt	EC: 37 000(formazan)
<a href="#">F98885</a> , 10g	M.W.: 651.35 g/mol CAS: [150849-52-8]	Solubility: 10 mg/ml H <sub>2</sub> O, 0.65 mg/ml 50mM Tris buffer, pH 8.0

The tetrazolium salt WST-1 is cleaved to formazan by a complex cellular mechanism that occurs primarily at the surface. This bioreduction is mostly dependent on the glycolytic NAD(P)H production of viable cells. Therefore the amount of formazan dye formed directly correlates to the number of metabolically active cells in the culture. The stability of WST-1 allows for its formulation as a ready-to-use solution. Suitable for cell proliferation and cytotoxicity assays.

Ref: Ishiyama, M. et al.: Chem. Pharm. Bull. 41(6), 1118-1122 (1993)

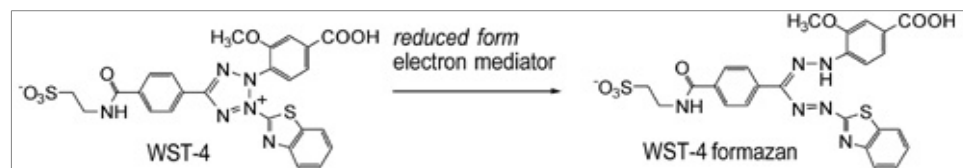


<a href="#">T33230</a> , 100mg	<b>WST-3</b>	$\lambda_{\max}$ (formazan): 433nm
<a href="#">T33231</a> , 500mg	2-(4-Iodophenyl)-3-(2,4-dinitrophenyl)-5-(2,4-disulfofophenyl)-2H-tetrazolium,	EC: >36 000(234nm)
<a href="#">T33232</a> , 1g	sodium salt	EC: 40 000(formazan)
<a href="#">T33233</a> , 10g	M.W.: 696.34 g/mol CAS: [515111-36-1]	Solubility: 10mg/mL water

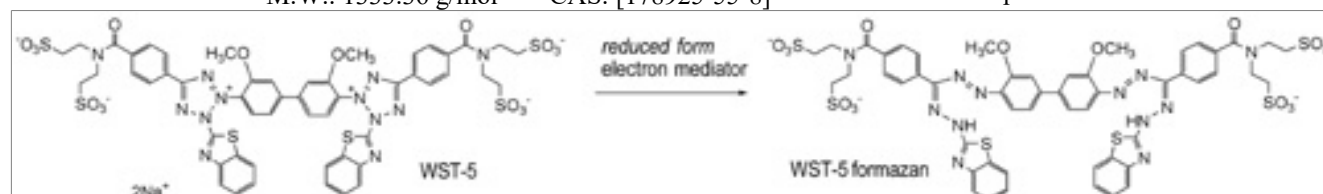


ref: Ishiyama, M., et al.: Chem. Pharm. Bull., 41, 1118 (1993)

<a href="#">T33240</a> , 100mg	<b>WST-4</b>	$\lambda_{\max}$ (formazan): 550nm
<a href="#">T33241</a> , 500mg	2-Benzothiazolyl-3-(4-carboxy-2-methoxyphenyl)-5-[4-(2-sulfoethylcarbamoyl)phenyl]-2H-tetrazolium	EC: >28 000(264nm)
	M.W.: 580.95 g/mol CAS: [178925-54-7]	EC: 10 000(formazan)
		Solubility: 1g/L water



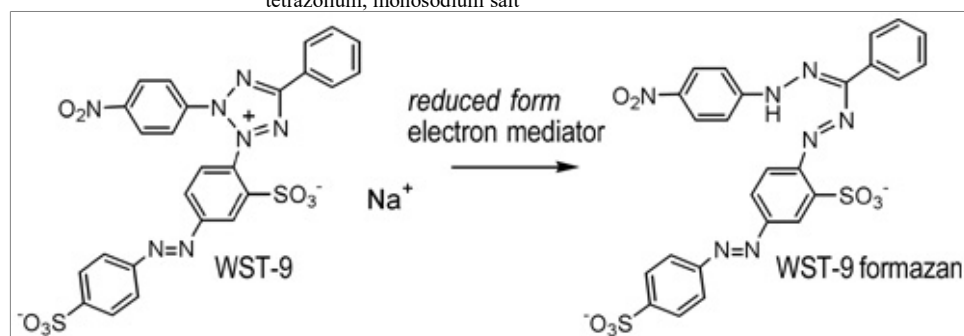
<a href="#">T33250</a> , 100mg	<b>WST-5</b>	$\lambda_{\max}$ (formazan): 550nm
<a href="#">T33251</a> , 500mg	2,2'-Dibenzothiazolyl-5,5'-bis[4-di(2-sulfoethyl)carbamoylphenyl]-3,3'-(3,3'-dimethoxy-4,4'-biphenylene)ditetrazolium, disodium salt	EC: 50 000(262nm)
	2,2'-(3,3'-dimethoxy[1,1'-biphenyl]-4,4'-diyl)bis[3-(2-benzothiazolyl)-5-[4-[[bis(2-sulfoethyl)amino]carbonyl]phenyl]-2H-Tetrazolium bis(inner salt) disodium salt	EC: 27 000(formazan)
	M.W.: 1333.36 g/mol CAS: [178925-55-8]	Solubility: in phosphate buffer pH:8.0



<a href="#">QZ8430</a> , 1g	<b>WST-8</b>	$\lambda_{\max}$ (formazan): 450nm
<a href="#">QZ8431</a> , 10g	2-(2-methoxy-4-nitrophenyl)-3-(4-nitrophenyl)-5-(2,4-disulfofophenyl)-2H-tetrazolium,monoSodium salt;formazan	Solubility: in phosphate buffer pH:8.0
	M.W.: 600.47 g/mol	

[BB4490](#), 100mg**WST-9**

2-(4-Nitrophenyl)-5-phenyl-3-[4-(4-sulfophenylazo)-2-sulfophenyl]-2H-tetrazolium, monosodium salt

[T31990](#), 100mg**Methoxy-PMS**

1-Methoxy-5-methylphenazinium, methylsulfate

[T31991](#), 500mg

M.W.: 336.36 g/mol CAS: [65162-13-2]

[T31992](#), 1g[T31993](#), 10gE<sub>o</sub>: 0.063V

EC: 2 700(505nm)

Solubility: in phosphate buffer

pH:8.0

Electron coupling reagent 1-Methoxy PMS is easily dissolved by water and alcohol. Its redox potential is +63 mV. Though phenazinium methylsulfate (PMS) is commonly used as an electron carrier for NADH-tetrazolium, the stability of PMS is very poor. However, 1-Methoxy PMS solution can be stored at room temperature for over 3 months without protection from light. Therefore, it is a useful reagent for NAD(P)H-tetrazolium-based assay systems.

**Related products:****\*WST based cell assays**

Cell Counting Kit (WST-8 based, not toxic)

[#899650](#)

Cell Counting Kit –SK (high sensitivity)

[#LL0851](#)

SOD assay kit (WST-1 based)

[#899650](#)

Total Glutathione Quantification Kit

[#T33220](#)**Other information****For R&D use in vitro only.**

Please contact InterBioTech – Interchim for any other information

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