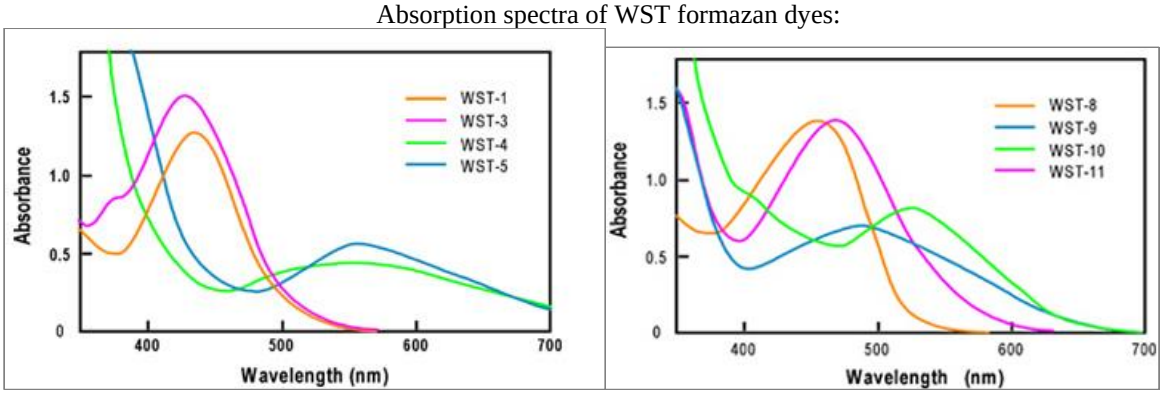
Water Soluble Tetrazolium Salts (WSTs)

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

Color changes when reduced. Usefull 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, it 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 phenlyazo-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 CAS: 150849-52-8	651.35	>21 600(244nm)	>37 000(438nm)
WST-3 #T33230, 100mg CAS: 515111-36-1	693.34	>36 000(234nm)	>30 000(433nm)
WST-4 #T33240 , 100mg CAS: 178925-54-7	580.95	>28 000(264nm)	>10 000(550nm)
WST-5 #T33250, 100mg CAS: 178925-55-8	1331.35	>50 000(234nm)	>27 000(550nm)
WST-8 #QZ8430, 100mg CAS: 122295-54-7	600.47		
WST-9 #BB4490, 100mg CAS: 122295-54-7			

*Electron mediators	MW	Molar absorptivity	Molar absorptivity
1-Methoxy-PMS #T31990 CAS: 65162-13-2 ; 1-Methoxy-5-ethylphenaziniummethylsulfate (Z)	336.36	>2 700 (505nm)	Soluble @34mg/100ml
1-Methoxy-PES #B2XHY0 CAS: 133395-54-7; 1-Methoxy-5-ethylphenazinium ethylsulfate (Z)	364.42		

	PMS	1-Methoxy PMS	1-Methoxy-PES
Water Solubility	O	O	O
Light Stability	x	O	O
pH Stabiity	∇	∇	O

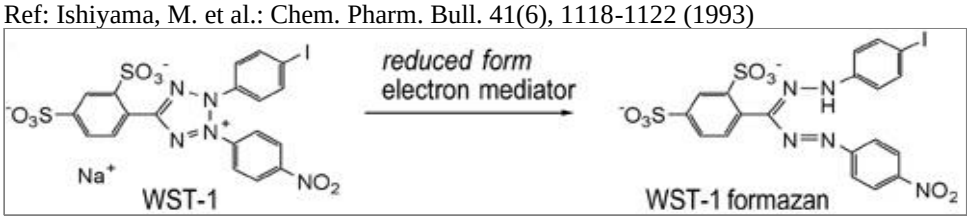
Storage: store at 0-5°C (L) or –20°C for long term.

LIFE SCIENCES
interchim®
211bis Avenue J.F. Kennedy - BP 1140 - 03103 Montluçon Cedex - France
S.A. a conseil de surveillance 1 548 000 euro - RCS Montlucon 917 050 171 - APE 4669B

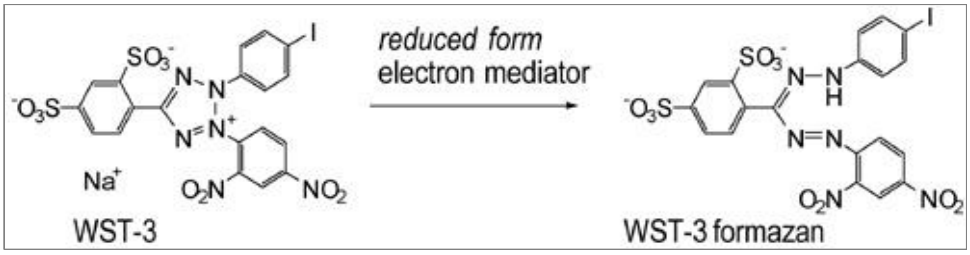
Catalog #:	*Name / Features*	
F98880, 100mg F98881, 500mg F98884, 1g F98885, 10g	**WST-1** Syn.: 2-(4-Iodophenyl)-3-(4-nitrophenyl)-5-(2,4-disulfophenyl)-2H-tetrazolium, monosodium salt M.W.: 651.35 g/mol CAS: 150849-52-8	λ_{max}(formazan): 438nm EC: 21 600(244nm) EC: 37 000(formazan) Solubility: 10 mg/ml H_2O, 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 munber of metabolically active cells in the culture. The stabilty of WST-1 allows for its formulation as a ready-to-use solution. Suitable for cell proliferation and cytotoxcity assays.

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

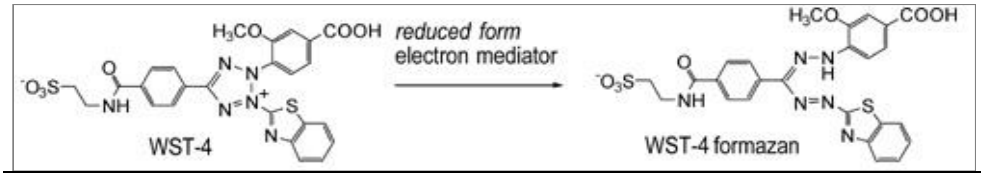


T33230, 100mg T33231, 500mg T33232, 1g T33233, 10g	**WST-3** 2-(4-Iodophenyl)-3-(2,4-dinitrophenyl)-5-(2,4-disulfophenyl)-2H-tetrazolium, sodium salt M.W.: 696.34 g/mol CAS: 515111-36-1	λ_{max}(formazan): 433nm EC: >36 000(234nm) EC: 40 000(formazan) Solubility: 10mg/mL water

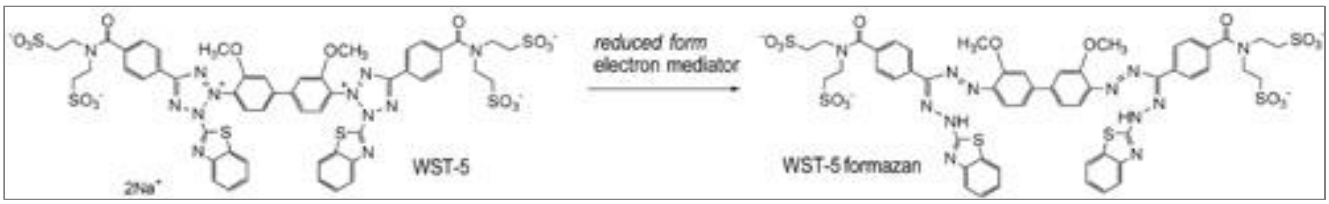


ref: Ishiyama, M., et al.: Chem. Pharm. Bull., 41, 1118 (1993)

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



T33250, 100mg T33251, 500mg	**WST-5** 2,2'-Dibenzothiazolyl-5,5'-bis[4-di(2-sulfoethyl)carbamoylphenyl]-3,3'-(3,3'-dimethoxy-4,4'-biphenylene)ditetrazolium, disodium salt 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 M.W.: 1333.36 g/mol CAS: 178925-55-8	λ_{max}(formazan): 550nm EC: 50 000(262nm) EC: 27 000(formazan) Solubility: in phosphate buffer pH:8.0



QZ8430, 1g
QZ8431, 10g

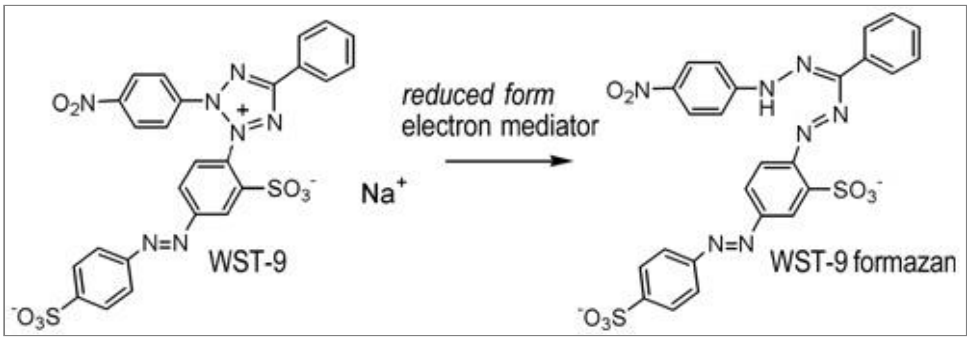
WST-8
2-(2-methoxy-4-nitrophenyl)-3-(4-nitrophenyl)-5-(2,4-disulfophenyl)-2H-tetrazolium,monoSodium salt;formazan
M.W.: 600.47 g/mol

λ_{max}(formazan): 450nm

Solubility: in phosphate buffer pH:8.0

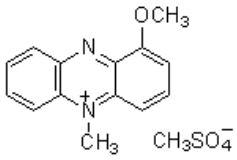
BB4490, 100mg

WST-9
2-(4-Nitrophenyl)-5-phenyl-3-[4-(4-sulfophynylazo)-2-sulfophenyl]-2H-tetrazolium, monosodium salt



T31990, 100mg
T31991, 500mg
T31992, 1g
T31993, 10g

Methoxy-PMS
1-Methoxy-5-methylphenazinium, methylsulfate
M.W.: 336.36 g/mol CAS: [65162-13-2]
Eo: 0.063V
EC: 2 700(505nm)
Solubility: in phosphate buffer pH:8.0

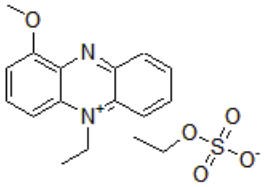


Electron coupling reagent 1-Methoxy PMS is easily dissolved by water and alcohol. Its redox potential is +63 mV. Though phenazinium methylsulfate (PMS) is commonly used as an electron carrier for NADH-tetrazolium, the stabilty of PMS is very poor. However, 1-Methoxy PMS solution can be stored at room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

B2XHY0, 100mg

Methoxy-PES
1-Methoxy-5-ethylphenazinium ethylsulfate
M.W.: 364.42 g/mol CAS: 133395-54-7

-Higher solution stability than 1-Methoxy PMS
-Stable in wide range of pH
-Higher solution stability than diaphorase



The 1-Methoxy PES solution can be stored long term.

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

Rev.V01E-J08E

LIFE SCIENCES
interchim®
211bis Avenue J.F. Kennedy - BP 1140 - 03103 Montluçon Cedex - France
S.A. a conseil de surveillance 1 548 000 euro - RCS Montlucon 917 050 171 - APE 4669B