

Fixation Buffer

Catalog# / Size	420801 / 100 mL
Regulatory Status	RUO
Other Names	Fixative, Paraformaldehyde
Description	Fixation Buffer is useful for intracellular staining procedures, e.g., in preparation of cells for staining intracellular cytokines or other proteins. Fixation Buffer is used to fix cells prior to permeabilization using Permeabilization Wash Buffer (Cat. No. 421002). BioLegend's Fixation Buffer has been formulated with prescreened paraformaldehyde with low background, thus producing the greatest signal to noise ratio.

Product Details

Storage & Handling	This buffer solution should be stored between 2°C and 8°C.
Application	ICFC - Quality tested ICC
Recommended Usage	For cell fixation, use 250 µL fixation buffer per tube and leave it in the dark for 20 minutes at room temperature. It is recommended that the reagent be titrated for optimal performance for each application. For the fixation procedure, please refer to the "Intracellular Cytokine Staining Protocol" under "Support" on BioLegend's website. Caution: This buffer contains paraformaldehyde, which is toxic and mutagenic. Please handle with caution and wear gloves, lab coat and necessary protection to avoid direct body contacts.
Application Notes	This 1X PBS solution contains 4% paraformaldehyde, which is toxic and is a suspected carcinogen. Contact with eyes, skin and mucous membranes should be avoided.
Additional Product Notes	View more applications data using this product to stain Veri-Cells™ lyophilized control cells and to perform phospho-flow in our Scientific Poster Library.
Application References	<ol style="list-style-type: none"> 1. Kang YJ, <i>et al.</i> 2007. <i>Nature Immunol.</i> 8:601. 2. Kenna TJ, <i>et al.</i> 2010. <i>J. Immunol.</i> 184:598. PubMed 3. Sullivan BP, <i>et al.</i> 2010. <i>Am J Pathol.</i> 177:2837. PubMed 4. del Rio ML, <i>et al.</i> 2011. <i>Transplantation.</i> 92:1085. PubMed 5. del Rio ML, <i>et al.</i> 2012. <i>J. Immunol.</i> 188:4885. PubMed 6. Marongiu L, <i>et al.</i> 2013. <i>PLoS One.</i> 8:75684. PubMed 7. Haberthur K, <i>et al.</i> 2013. <i>J Virol.</i> 87:11751. PubMed 8. Busskamp V, <i>et al.</i> 2014. <i>Mol Syst Biol.</i> 10:760. PubMed
Product Citations	<ol style="list-style-type: none"> 1. Haberthur K, <i>et al.</i> 2013. <i>J Virol.</i> 87:11751. PubMed 2. Li B, Schmidt N 2016. <i>PLoS One.</i> 11: 0162427. PubMed 3. Darzaniazi M, <i>et al.</i> 2020. <i>Int J Mol Sci.</i> 21:00. PubMed 4. Mirlekar B, <i>et al.</i> 2020. <i>Cancer Immunol Res.</i> 0.536111111. PubMed 5. Salybekov AA, <i>et al.</i> 2018. <i>PLoS One.</i> 13:e0203244. PubMed 6. Yokozeki Y, <i>et al.</i> 2021. <i>Biomed Res Int.</i> 2021:7988320. PubMed 7. Tocheva AS, <i>et al.</i> 2020. <i>Curr Protoc Immunol.</i> 130:e103. PubMed 8. Michalaki C, <i>et al.</i> 2022. <i>Curr Protoc.</i> 2:e505. PubMed 9. Lentucci C, <i>et al.</i> 2017. <i>J Biol Chem.</i> 292:2754-2772. PubMed 10. Ede J, <i>et al.</i> 2015. <i>Toxicol Sci.</i> 148: 108 - 120. PubMed 11. Spitzer SO, <i>et al.</i> 2019. <i>Neuron.</i> 101:459. PubMed 12. Li L, <i>et al.</i> 2017. <i>Sci Rep.</i> 10.1038/s41598-017-14000-z. PubMed 13. Li Q, <i>et al.</i> 2022. <i>Cell Rep.</i> 40:111308. PubMed 14. Albaghdadi AJH, <i>et al.</i> 2022. <i>Int J Mol Sci.</i> 23:. PubMed 15. van Vloten JP, <i>et al.</i> 2022. <i>J Immunother Cancer.</i> 10:. PubMed 16. Zhang L, <i>et al.</i> 2021. <i>J Immunol.</i> 207:590. PubMed 17. Li X, <i>et al.</i> 2022. <i>Nat Commun.</i> 13:2794. PubMed 18. Busskamp V, <i>et al.</i> 2014. <i>Mol Syst Biol.</i> 10:760. PubMed 19. Jimenez-Duran G, <i>et al.</i> 2020. <i>EBioMedicine.</i> 61:103039. PubMed 20. Zhang Y, <i>et al.</i> 2020. <i>Oncol Lett.</i> 1.053472222. PubMed 21. Lownik JC, <i>et al.</i> 2020. <i>Biochem Biophys Res Commun.</i> 522:442. PubMed 22. Kuo T, <i>et al.</i> 2017. <i>Oncogene.</i> 10.1038/onc.2017.156. PubMed

(PubMed link indicates BioLegend citation)

23. Angiari S, *et al.* 2020. *Cell Metab.* 31:391. [PubMed](#)
24. Garton J, *et al.* 2021. *Immunohorizons.* 5:802. [PubMed](#)
25. Duan Q, *et al.* 2021. *Front Cell Dev Biol.* 9:761193. [PubMed](#)
26. Stegelmeier AA, *et al.* 2022. *Biomedicines.* 10: . [PubMed](#)
27. Thaker YR, *et al.* 2022. *Front Oncol.* 12:884196. [PubMed](#)
28. de Groot AE, *et al.* 2021. *Prostate.* 81:629. [PubMed](#)
29. Zhang S, *et al.* 2022. *Cell Death Dis.* 13:844. [PubMed](#)
30. Jenull S, *et al.* 2021. *Cell Reports.* 36(3):109406. [PubMed](#)
31. Kakiyama G, *et al.* 2020. *J Lipid Res.* 61:1629. [PubMed](#)
32. Wright A, *et al.* 2015. *Immunobiology.* 220: 859-864. [PubMed](#)
33. Martinez-Usatorre A, *et al.* 2020. *Front Immunol.* 11:340. [PubMed](#)
34. Martinez-Usatorre A, *et al.* 2019. *Cancer Immunol Res.* 0.995138889. [PubMed](#)
35. Bawazir M, *et al.* 2022. *Front Immunol.* 13:1033794. [PubMed](#)
36. Tsai CY, *et al.* 2022. *J Biomed Sci.* 29:47. [PubMed](#)
37. van der Heide V, *et al.* 2022. *Cell Rep.* :110508. [PubMed](#)
38. Kakiyama G, *et al.* 2020. *J Lipid Res.* 61:1629. [PubMed](#)
39. Brooks JF, *et al.* 2020. *J Immunol.* 205:1239. [PubMed](#)
40. Guye P, *et al.* 2016. *Nat Commun.* 7:10243. [PubMed](#)
41. Tang B, *et al.* 2020. *Clin Cancer Res.* 26:2216. [PubMed](#)
42. Jtte BB, *et al.* 2021. *iScience.* 24(8):102833. [PubMed](#)
43. Eslani M, *et al.* 2017. *Invest Ophthalmol Vis Sci.* 58(12):5507-5517. [PubMed](#)
44. Haryadi L, *et al.* 2019. *Vet World.* 12:1529. [PubMed](#)
45. Herda S, *et al.* 2021. *Int J Cancer.* 148:3097. [PubMed](#)
46. Bayer AL, *et al.* 2022. *Cancers (Basel).* 14: . [PubMed](#)
47. Glaubitz J, *et al.* 2022. *Nat Commun.* 13:4502. [PubMed](#)
48. Zhang X, *et al.* 2020. *J Immunol.* 205:1743. [PubMed](#)
49. Subham S, *et al.* 2022. *Breast Cancer Res Treat.* Online ahead of print. [PubMed](#)
50. Su W, *et al.* 2022. *Front Immunol.* 13:952338. [PubMed](#)
51. Datta A, *et al.* 2022. *J Fungi (Basel).* 8: . [PubMed](#)
52. Wu Q, *et al.* 2022. *Cell Mol Life Sci.* 79:137. [PubMed](#)
53. Li Y, *et al.* 2022. *Clin Transl Immunology.* 11:e1362. [PubMed](#)
54. Shamsi F, *et al.* 2021. *Nat Metab.* 3:485. [PubMed](#)
55. Klepsch V, *et al.* 2020. *Cell Commun Signal.* 18:08. [PubMed](#)
56. Sullivan B, *et al.* 2010. *Am J Pathol.* 177:2837. [PubMed](#)
57. Cheng K, *et al.* 2021. *Nat Commun.* 12:2041. [PubMed](#)
58. Zhang B, *et al.* 2022. *J Exp Med.* 219: . [PubMed](#)
59. Callahan SM, *et al.* 2021. *Curr Protoc.* 1:e294. [PubMed](#)
60. Huang M, *et al.* 2022. *Adv Sci (Weinh).* 9:e2101267. [PubMed](#)
61. Li F J, *et al.* 2022. *PLoS One.* 17:e0277019. [PubMed](#)
62. Park HB, *et al.* 2020. *Oncoimmunology.* 9:1772663. [PubMed](#)
63. Takahashi K, *et al.* 2022. *Cell Rep Methods.* 2:100155. [PubMed](#)
64. Zhang L, *et al.* 2021. *Methods Mol Biol.* 2388:175. [PubMed](#)
65. Rada M, *et al.* 2021. *Commun Biol.* 4:950. [PubMed](#)
66. Chakraborty S, *et al.* 2022. *Sci Transl Med.* . [PubMed](#)
67. Leonard NA, *et al.* 2021. *Cancers (Basel).* 13: . [PubMed](#)
68. Chen L, *et al.* 2021. *Cell Death Differ.* 28:1880. [PubMed](#)
69. Cho S, *et al.* 2017. *Sci Rep.* 7:35. [PubMed](#)
70. Callahan S, *et al.* 2020. *Cell Microbiol.* 22:e13210. [PubMed](#)
71. Jimenez RV, *et al.* 2019. *Front Immunol.* 1.932638889. [PubMed](#)
72. Elliott PR, *et al.* 2021. *Cell Rep.* 37:109777. [PubMed](#)
73. Balan I, *et al.* 2022. *Front Immunol.* 13:940095. [PubMed](#)
74. Bunting MD, *et al.* 2022. *Sci Adv.* 8:eabk3327. [PubMed](#)
75. Li J, *et al.* 2022. *J Tissue Eng.* 13:20417314221127908. [PubMed](#)
76. Lamb C, *et al.* 2016. *J Crohns Colitis.* 10.1093/ecco-jcc/jjw189. [PubMed](#)
77. Xu Z, *et al.* 2016. *Nat Commun.* 7:10728. [PubMed](#)
78. Wei W, *et al.* 2022. *mSystems.* 7:e0046922. [PubMed](#)
79. Zhao X, *et al.* 2022. *Nat Protoc.* 17:2240. [PubMed](#)
80. Yang J, *et al.* 2022. *Microbiome.* 10:149. [PubMed](#)
81. Alvandi Z, *et al.* 2022. *J Am Heart Assoc.* 11:e023695. [PubMed](#)
82. van Duijn A, *et al.* 2021. *Cancer Immunol Immunother.* Online ahead of print. [PubMed](#)
83. Jakic B, *et al.* 2021. *Cell Death Dis.* 12:187. [PubMed](#)
84. Bekeschus S, *et al.* 2016. *J Leukoc Biol.* 100: 791 - 799. [PubMed](#)
85. Li Q, *et al.* 2017. *Front Immunol.* 0.797916667. [PubMed](#)
86. Williamson LM, *et al.* 2021. *NPJ Precis Oncol.* 5:103. [PubMed](#)
87. Gunasena M, *et al.* 2022. *Sci Rep.* 12:12377. [PubMed](#)
88. Hornigold K, *et al.* 2022. *Front Immunol.* 13:888415. [PubMed](#)
89. Yang B, *et al.* 2022. *Bioengineered.* 13:2685. [PubMed](#)
90. Wang L, *et al.* 2020. *EMBO J.* 39:e104514. [PubMed](#)
91. Liu X, *et al.* 2016. *Sci Rep.* 6:36722. [PubMed](#)
92. Rio M, *et al.* 2012. *J Immunol.* 188:4885. [PubMed](#)
93. Kundu K, *et al.* 2019. *Cancer Immunol Res.* 1.069444444. [PubMed](#)
94. Bajpai G, *et al.* 2018. *Nat Med.* 24:1234. [PubMed](#)
95. Wilmes A, *et al.* 2017. *Toxicol In Vitro.* 10.1016/j.tiv.2017.07.023. [PubMed](#)
96. Lundtoft C, *et al.* 2017. *PLoS Pathogens.* 13(6):e1006425. [PubMed](#)
97. Willis RA, *et al.* 2021. *Curr Protoc.* 1:e36. [PubMed](#)
98. Chen DL, *et al.* 2021. *Mol Cancer.* 20:166. [PubMed](#)
99. Rio M, *et al.* 2011. *Transplantation.* 92:1085. [PubMed](#)
100. Dominguez CX, *et al.* 2020. *Cancer Discov.* 0.577777778. [PubMed](#)
101. Wei Z, *et al.* 2021. *Nat Commun.* 0.805555556. [PubMed](#)
102. Chen YF, *et al.* 2019. *J Biomed Sci.* 26:85. [PubMed](#)

103. Hiza H, *et al.* 2021. *Sci Rep.* 11:13190. [PubMed](#)
104. Xu Q, *et al.* 2021. *Theranostics.* 11:1937. [PubMed](#)
105. Wen T, *et al.* 2022. *Cancer Immunol Res.* 10:162. [PubMed](#)
106. Ma K, *et al.* 2022. *iScience.* 25:104347. [PubMed](#)
107. Constant DA, *et al.* 2022. *Immunohorizons.* 6:416. [PubMed](#)
108. Koyama T, *et al.* 2022. *Curr Issues Mol Biol.* 44:3146. [PubMed](#)
109. Gutierrez WR, *et al.* 2021. *Sci Rep.* 1.220833333. [PubMed](#)
110. Yokota-Nakatsuma A, *et al.* 2016. *Sci Rep.* 6:37914. [PubMed](#)
111. Kenna T, *et al.* 2010. *J Immunol.* 184:598. [PubMed](#)
112. Dong M, *et al.* 2022. *J Immunother Cancer.* 10:. [PubMed](#)
113. Mirlekar B, *et al.* 2022. *Cell Rep Med.* :100744. [PubMed](#)
114. Rive CM, *et al.* 2022. *Mol Ther Methods Clin Dev.* 26:4. [PubMed](#)
115. Bruno MEC, *et al.* 2022. *Geroscience.* 44:1761. [PubMed](#)
116. Teh MR, *et al.* 2021. *Front Immunol.* 12:714613. [PubMed](#)
117. Kakiyama G, *et al.* 2020. *J Lipid Res.* 61:1629. [PubMed](#)
118. Wang Y, *et al.* 2020. *Virolog Sin.* 36:122. [PubMed](#)
119. Glaser K, *et al.* 2016. *PLoS One.* 11: 0146898. [PubMed](#)
120. Park SR, *et al.* 2020. *Cell Rep.* 32:108077. [PubMed](#)
121. Woo MS, *et al.* 2021. *J Exp Med.* :218. [PubMed](#)
122. Ansari M, *et al.* 2017. *Cell Signal.* 10.1016/j.cellsig.2017.04.014. [PubMed](#)
123. Ahmad S, *et al.* 2017. *Prog Neuropsychopharmacol Biol Psychiatry.* 10.1016/j.pnpbp.2017.06.034. [PubMed](#)
124. Chen RH, *et al.* 2021. *Front Immunol.* 11:594775. [PubMed](#)
125. Gerson-Gurwitz A, *et al.* 2021. *Front Oncol.* 11:766298. [PubMed](#)
126. Koutník J, *et al.* 2022. *Cell Commun Signal.* 20:54. [PubMed](#)
127. Zhao X, *et al.* 2022. *iScience.* 25:104690. [PubMed](#)
128. Cébulo-Vázquez A, *et al.* 2022. *PLoS One.* 17:e0264566. [PubMed](#)
129. Lei L, *et al.* 2021. *Front Cell Dev Biol.* 659744:9. [PubMed](#)
130. Frafjord A, *et al.* 2020. *Scand J Immunol.* e12889:92. [PubMed](#)
131. Lownik JC, *et al.* 2020. *Biochem Biophys Res.* 24:100803. [PubMed](#)
132. Labi V, *et al.* 2019. *Genes Dev.* 33:1673. [PubMed](#)
133. Gensterblum E, *et al.* 2017. *J Autoimmun.* 10.1016/j.jaut.2017.09.011. [PubMed](#)
134. Zischke J, *et al.* 2017. *PLoS Pathogens.* 13(6):e1006454. [PubMed](#)
135. Rhoades NS, *et al.* 2022. *Cell Rep.* 39:110725. [PubMed](#)
136. Tatangelo V, *et al.* 2022. *Front Oncol.* 12:877495. [PubMed](#)
137. Huang T, *et al.* 2022. *Nat Commun.* 13:3489. [PubMed](#)
138. Kissel T, *et al.* 2022. *Sci Adv.* 8:eabm1759. [PubMed](#)
139. Deng Y, *et al.* 2021. *Nat Commun.* 12:7041. [PubMed](#)
140. Haunerding V, *et al.* 2021. *Front Immunol.* 12:740047. [PubMed](#)
141. DiMuzio JM, *et al.* 2021. *Vaccine X.* 8:100098. [PubMed](#)
142. Wang YJ, *et al.* 2021. *Sci Rep.* 11:8054. [PubMed](#)
143. Wawrzyniak M, *et al.* 2021. *Pharmacol Res Perspect.* 9:e00837. [PubMed](#)
144. Sun F, *et al.* 2022. *Cell Death Dis.* 13:181. [PubMed](#)
145. Witt G, *et al.* 2020. *Cell Biol Toxicol.* . [PubMed](#)
146. Marongiu L, *et al.* 2013. *PLoS One.* 8:75684. [PubMed](#)
147. Nouraei N, *et al.* 2017. *Exp Neurol.* 10.1016/j.expneurol.2017.10.017. [PubMed](#)
148. Sun Y, *et al.* 2022. *iScience.* 25:104846. [PubMed](#)
149. Wang X, *et al.* 2022. *Elife.* 11:. [PubMed](#)
150. Swarnalekha N, *et al.* 2021. *Sci Immunol.* 6:. [PubMed](#)
151. Clancy-Thompson E, *et al.* 2015. *Cancer Immunol Res.* 3: 956-967. [PubMed](#)
152. Wang L, *et al.* 2016. *Oncogene.* 10.1038/onc.2016.380. [PubMed](#)
153. Melcher M, *et al.* 2017. *Stem Cell Res Ther.* 10.1186/s13287-017-0601-7. [PubMed](#)
154. Zhang Z, *et al.* 2021. *Front Immunol.* 12:699478. [PubMed](#)
155. Spiljar M, *et al.* 2021. *Cell Metab.* 33:2231. [PubMed](#)
156. Chen Y, *et al.* 2021. *Braz J Med Biol Res.* 54:e9570. [PubMed](#)
157. Xiao C, *et al.* 2021. *STAR Protoc.* 2:100789. [PubMed](#)
158. Ikebuchi R, *et al.* 2016. *Sci Rep.* 6:35002. [PubMed](#)
159. Liu Q, *et al.* 2016. *Cell Death Dis.* 1.93125. [PubMed](#)
160. Nightingale K, *et al.* 2018. *Cell Host Microbe.* 24:447. [PubMed](#)
161. Guo Z, *et al.* 2022. *Neurobiol Pain.* 12:100096. [PubMed](#)
162. Yoshikawa AM, *et al.* 2021. *Nat Commun.* 12:7106. [PubMed](#)

Antigen Details

Antigen References

1. Current Protocols in Immunology (John Wiley & Sons New York) Unit 6.24 *Detection of Intracellular Cytokines by Flow Cytometry* (Barbara Foster and Calman Prussin NIAID NIH Bethesda MD).
2. Sander B, *et al.* 1991. *Immunol. Rev.* 119:65.
3. Sander B, *et al.* 1993. *J. Immunol. Meth.* 166:201.
4. Prussin C, *et al.* 1995. *J. Immunol. Meth.* 188:117.

Gene ID

NA

Related Protocols

[Surface and Intracellular Cytokine Staining for Flow Cytometry - Video](#)

[Intracellular Flow Cytometry Staining Protocol](#)

For research use only. Not for diagnostic use. Not for resale. BioLegend will not be held responsible for patent infringement or other violations that may occur with the use of our products.

*These products may be covered by one or more Limited Use Label Licenses (see the BioLegend Catalog or our website, www.biolegend.com/ordering#license). BioLegend products may not be transferred to third parties, resold, modified for resale, or used to manufacture commercial products, reverse engineer functionally similar materials, or to provide a service to third parties without written approval of BioLegend. By use of these products you accept the terms and conditions of all applicable Limited Use Label Licenses. Unless otherwise indicated, these products are for research use only and are not intended for human or animal diagnostic, therapeutic or commercial use.

BioLegend Inc., 8999 BioLegend Way, San Diego, CA 92121 www.biolegend.com
Toll-Free Phone: 1-877-Bio-Legend (246-5343) Phone: (858) 768-5800 Fax: (877) 455-9587