



MASTERTECH BULLETIN

(Revised 04/28/11)

EXCELL PLUS™

ADVANCING FIXATION SCIENCE SINCE 1989

EXCELL PLUS™, THE PRODUCT AND ITS PURPOSE:

For nearly one hundred years, 10% Formalin has been the tissue fixative of choice in Pathology, Histology, Cytology, Hematology, Parasitology, and Biology. Formaldehyde has come under attack for being a health hazard as well as an environmentally unfriendly reagent. This has created a need for development of safer tissue fixatives. **ExCell Plus™** Tissue Fixative is the result of 15 years of continuous research to develop a low-hazard, non-tearing, non-irritating, pleasant smelling replacement for 10% Formalin. Fixation is accomplished by changing the chemistry of tissue components at the molecular water level. Chemical fixation means that cellular biochemicals must be replaced, altered, or disrupted to allow denaturation and crosslinking of tissue elements. **ExCell Plus™** leads the way in advancing fixation science by continuous improvements in penetration speed and crosslinking. Recent improvements to **ExCell Plus™** provides laboratory personnel with a low-hazard tissue fixative that fixes faster, cuts better, and actually smells good! For Pathologists and Histo-technicians a pleasant smelling low-hazard tissue fixative means less stress in all laboratory situations. **ExCell Plus™** provides strong antifungal and antiviral properties for safer transport, storage, and handling of biological tissue specimens. Tissue fixed with **ExCell Plus™** demonstrates outstanding results with routine histochemical stains, special histochemical stains, immunohistochemical stains (IHC), flowcytometry DNA analysis, and fluorescence in situ hybridization (FISH).

EXCELL PLUS™, INSTRUCTIONS FOR USE:

Use **ExCell Plus™** as you would 10% Formalin; permeation time is virtually identical. Many textbooks and journals indicate that for complete penetration and crosslinking, most tissue specimens require at least 24 hours in the tissue fixative and large specimens such as whole-organs, mastectomies, and placentas require at least 72 hours. Automated tissue processors with vacuum impregnation and heated retorts will drastically reduce these times. **ExCell Plus™** is compatible with Isopropyl or Reagent Alcohol and with Xylene or Xylene Substitutes. Paraffin's, including those formulated with high concentrations of plasticizers, will not cause insoluble polymers during impregnation; therefore microtome sectioning will be smooth and consistent. When using **ExCell Plus™** to fix whole-organs, mastectomies, and placentas it is recommended that specimens be opened and butterflied or bisected. Also, allow sufficient time in **ExCell Plus™** to insure complete penetration and fixation.

EXCELL PLUS™, TISSUE STORAGE:

Tissue specimens may be stored in **ExCell Plus™** for up to two years without tissue degradation or biological attack. Processing tissue samples which have been stored in **ExCell Plus™** for several months requires no deviation from normal processing protocols. **ExCell Plus™** will not over-harden tissue specimens, even when stored for long periods of time.

EXCELL PLUS™, STABILITY:

ExCell Plus™ is stable under normal laboratory conditions; please note the expiration date located on the product label. The color of **ExCell Plus™** may vary slightly but this does not affect product performance or stability. Because the freezing temperature of **ExCell Plus™** is slightly below that of water, **ExCell Plus™** may freeze during winter transit. If this occurs, allow product to thaw out at room temperature until completely liquefied; performance and stability of **ExCell Plus™** is unaffected.

EXCELL PLUS™, PRECAUTIONS:

ExCell Plus™ is non-flammable, non-corrosive, and a low-hazard when used as directed. When handling any laboratory reagent, appropriate personal protection equipment, including lab coat, gloves, and goggles is required. Mechanical exhaust ventilation should be used.

EXCELL PLUS™, DISPOSAL:

Dispose **ExCell Plus™** in accordance with all local, state and federal environmental regulations. American Master*Tech Scientific, Inc. has commissioned Sierra Analytical, Inc. to analyze this product using EPA Method 245.1 for mercury compounds and EPA #8260B for wastewater volatile organics. Their report is located on the back of this bulletin.

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American Master Tech Scientific, Inc.
 1330 Thurman St.
 Lodi CA, 95240

Volatile Organic Compounds by EPA Method 8260B

Sierra Analytical Labs, Inc.

Analyte	Reporting Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	µg/L	1	B4D2018	04/19/04	04/20/04	8260B	
Bromobenzene	ND	1.0	"	"	"	"	"	"	
Bromochloromethane	ND	1.0	"	"	"	"	"	"	
Bromodichloromethane	ND	1.0	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
Bromomethane	ND	5.0	"	"	"	"	"	"	
n-Butylbenzene	ND	1.0	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.0	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.0	"	"	"	"	"	"	
Chlorobenzene	ND	1.0	"	"	"	"	"	"	
Chloroethane	ND	5.0	"	"	"	"	"	"	
Chloroform	ND	1.0	"	"	"	"	"	"	
Chloromethane	ND	5.0	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.0	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	1.0	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.0	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	1.0	"	"	"	"	"	"	
Dibromomethane	ND	1.0	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.0	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.0	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.0	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.0	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.0	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.0	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.0	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.0	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.0	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.0	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.0	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Hexachlorobutadiene	ND	1.0	"	"	"	"	"	"	
Isopropylbenzene	ND	1.0	"	"	"	"	"	"	
p-Isopropyltoluene	ND	1.0	"	"	"	"	"	"	
Methylene chloride	ND	1.0	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	1.0	"	"	"	"	"	"	
Naphthalene	ND	1.0	"	"	"	"	"	"	
n-Propylbenzene	ND	1.0	"	"	"	"	"	"	
Styrene	1.1	1.0	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.0	"	"	"	"	"	"	
1,1,1,2,2-Tetrachloroethane	ND	1.0	"	"	"	"	"	"	
Tetrachloroethene	ND	1.0	"	"	"	"	"	"	
Toluene	ND	1.0	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.0	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.0	"	"	"	"	"	"	
Trichloroethene	ND	1.0	"	"	"	"	"	"	
Trichlorofluoromethane	ND	5.0	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
m,p-Xylene	3.3	1.0	"	"	"	"	"	"	
o-Xylene	1.7	1.0	"	"	"	"	"	"	

Metals by EPA 200 Series Methods

Sierra Analytical Labs, Inc.

Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Mercury	ND	0.00050	mg/L	5	B4D2134	04/21/04	04/22/04	EPA 245.1	

Excell Plus (0404247-01) Liquid Sampled: 04/15/04 15:00 Received: 04/19/04 10:30

Notes and Definitions

QM-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.	NR	Not Reported
DET	Analyte DETECTED	Dry	Sample results reported on a dry weight basis
ND	Analyte NOT DETECTED at or above the reporting limit	RPD	Relative Percent Difference



Fixing the facts about alternative: Tissue Fixatives

Let's face it, we are living in a Formalin world, and with Pathologists who are Formalin schooled. Why is that? For a number of reasons! It's cheap, it's proven itself with over a hundred years in service, its universally understood both in terms of usage and its effects on tissue specimens, and lets not forget the number one reason... Pathologists are used to it. They were educated with it, have used it, and have seen tissue fixed in it since day one of their careers. After all, what choices did they have? Alcohol never worked as well, and early attempts at Formalin substitutes were unacceptable to be blunt. Sounds like maybe we are trying to sell more Formalin right? Wrong! Find out why below.

Commonly Asked Question #1:

Why are pathologists resistant to using Formalin alternatives?

Answer: Pathologists are resistant to any type of change in the lab because they have to be! Imagine what stained tissue would look like under the microscope if a different paraffin, clearing agent, fixative, and staining procedure was used each time a biopsy was performed? This could cause a misdiagnosis, everyones number one fear! When it comes to accurately diagnosing a patient a pathologist needs consistency.

Commonly Asked Question #2:

What about the negative rumors surrounding Formalin substitutes?

Answer: Well there sure are a lot of them, but are they justified? Most of these rumors were formed when pathologists first tried formalin substitutes many years ago. Back then the rumors may have been warranted. Now, they have no basis, at least not with Master*Tech Formalin alternatives like ExCell Plus. Think about it... Over the last 10 years we have seen computers quadruple their speed and memory, flatscreen televisions, hybrid cars that get 60 miles per gallon, and private citizens building space ships. Why should anyone assume Formalin alternatives like ExCell Plus haven't kept pace with technology? The answer is you shouldn't assume anything. ExCell Plus is a sum of thousands of hours of Research and Development and hundreds of test formulations. In fact the formulation and results delivered by ExCell Plus have improved so much since original ExCell, that they shouldn't even share the same name. ExCell PLUS is superior to 10% Formalin in many ways and is definitely worth trying out.

Commonly Asked Question #3:

What are the strengths and weaknesses of Formalin and ExCell Plus?

Answer: Every Fixative has its strengths and weaknesses. Pathologists adjust to those morphological weaknesses produced by 10% Formalin. Over the years this adjusting has become procedure and accepted as the "norm". For instance, Formalin has always been a culprit for nuclear shrinking (as are many tissue fixatives). But can you compensate for the fact that Formalin is a known carcinogen, or for its hazardous disposal? Is it worth it? ExCell Plus has only one small imperfection that is a nonissue for most specimens. While it fixes and penetrates most tissues as fast as 10% Formalin, it takes slightly longer with fatty tissues. So what do you gain with a short wait? A lowhazard, noncarcinogenic, biodegradable, pleasant smelling fixative that you can probably pour right down your laboratory drain depending on your location. When comparing morphology of specimens fixed in 10% Formalin versus ExCell Plus, you'll notice brighter, more transparent nuclei and tissue elements, with improved contrast.



Fixatives	Tumor Analysis/ Infectious Agents	Lymphoma (Paraffin)	Hormone Receptors Prognosis Markers	Flow DNA Analysis	MIB-1 (Ki-67)	FISH*	PCR
Alcohol	●	●	●	●	●	●	●
B5	●	☀ ₁	●	⊘	●	⊘	⊘
Bouin	●	☀	●	⊘	●	⊘	☀
Carnoy's	●	●	●	●	●	●	⊘
ExCell Plus	●	●	●	●	●	●	●
Histochoice	●	●	●	⊘	●	⊘	●
Hollande's	●	●	☀	⊘	●	⊘	⊘
Lilly's	●	●	●	V	●	V	Unknown
NBF	●	●	●	●	●	●	●
No Tox	●	●	☀	⊘	⊘	⊘	Unknown
Omnifix	●	●	●	⊘	●	●	●
Penfix	●	●	●	●	●	●	●
Prefer	●	●	☀	☀	⊘	☀	⊘
Safeix	● ₂	☀ ₃	V	⊘	V	⊘	●
Streck	●	●	●	V	●	V	●
Ultrum	●	Unknown	●	⊘	●	Unknown	Unknown
Zinc/Fomalin	●	●	●	●	●	●	⊘

- Acceptable
- ☀ Not Recommended
- ⊘ Not Acceptable

V Variable

1 Not acceptable for CD21

2 Thick sections are required

3 Not acceptable for bcl-1, bcl-2, and grading (mitosis counts)

* HER2 by FISH.

Only 10% buffered formalin, paraformaldehyde, Karnovsky's Fix (16% paraformaldehyde, 50% glutaraldehyde) and Trump's fix acceptable.

Unknown IMPATH has not validated the use of these fixatives for the indicated test. Results are not guaranteed. Please use your discretion.