

*Fifth Edition*

# Extended Stability *for* Parenteral Drugs

**Caryn Dellamorte Bing**  
**Anna Nowobilski-Vasilios**

Donald J. Filibeck

Brenda L. Gray

J. Michael Hayes

Barbara Limburg-Mancini

Kevin M. McNamara

Diane Nitzki-George

Kevin L. Ross

Lisa Linn Siefert

Paula Zelle

American Society

of Hospital Pharmacists

Bethesda, Maryland

Preface.....	ix
About the Editors .....	xii
Writers.....	xii
How to Use This Reference .....	xiii
<b>Part I</b>	
<b>Applying Stability Data in Patient Care .....</b>	<b>3</b>
Introduction .....	3
Factors Affecting Extended Drug Stability.....	3
Preparation Sterility and Quality Assurance .....	4
Professional, Regulatory, and Accreditation Expectations.....	5
Commercial Products and Extemporaneous Compounding .....	7
Infusate Properties .....	8
Vascular Access Devices and Catheters Used in Medication Administration .....	9
Labeling Instructions.....	12
Assigning Beyond-Use Dates.....	12
Patient and Site-Specific Considerations .....	13
Considerations in Selecting Administration Methods and Infusion Devices.....	15
External Factors Affecting Stability.....	19
Ethanol and Antibiotic Locks .....	20
Summary.....	20
References.....	20
<b>Parenteral Nutrition .....</b>	<b>23</b>
Beyond-Use Dating of Parenteral Nutrition Formulations .....	23
Non-Formulation Factors Affecting PN Stability.....	23
Formulation Factors Affecting PN Stability.....	26
Commercial Products and Extemporaneous Compounding .....	29
Professional, Regulatory, and Accreditation Expectations and Guidance.....	29
Summary.....	30
<b>Parenteral Nutrition Monographs.....</b>	<b>31</b>
Carnitine .....	31
Chromium .....	31
Cimetidine.....	32
Copper .....	33
Famotidine .....	34
Folic Acid .....	35
Heparin .....	36
Iron.....	36
Manganese .....	37
Ranitidine .....	38
Selenium.....	39
Trace Elements .....	39
Vitamin A .....	40
Vitamin B1 .....	42
Vitamin B2 .....	43
Vitamin B3 .....	44
Vitamin B5 .....	44
Vitamin B6 .....	45
Vitamin B12.....	45
Vitamin C.....	46
Vitamin D.....	47
Vitamin E .....	48
Vitamin K .....	49
Zinc .....	49
References.....	50
<b>Part II</b>	
<b>Drug Monographs .....</b>	<b>55</b>
Acetaminophen.....	57
Acyclovir Sodium.....	58
Aldesleukin .....	60
Amikacin Sulfate .....	61
Amiodarone Hydrochloride.....	63
Amphotericin B.....	64
Amphotericin B Cholestryl Sulfate Complex .....	66
Amphotericin B Lipid Complex .....	67
Amphotericin B Liposome .....	68
Ampicillin Sodium .....	69
Ampicillin Sodium–Sulbactam Sodium .....	71
Azithromycin .....	73
Aztreonam.....	74
Baclofen.....	76
Bevacizumab .....	78
Bleomycin Sulfate .....	79
Bortezomib .....	80
Bumetanide .....	81
Bupivacaine Hydrochloride .....	82
Calcitriol .....	85
Carboplatin .....	86
Caspofungin Acetate.....	88
Cefazolin Sodium .....	89
Cefepime Hydrochloride .....	92
Cefotaxime Sodium.....	95
Cefotetan Disodium .....	98

# Contents

EXTENDED STABILITY FOR PARENTERAL DRUGS

Cefoxitin Sodium.....	100	Etoposide .....	175
Ceftaroline Fosamil .....	103	Etoposide Phosphate .....	177
Ceftazidime.....	104	Famotidine .....	178
Ceftriaxone Sodium .....	108	Fentanyl Citrate.....	179
Cefuroxime Sodium .....	112	Filgrastim.....	182
Chlorpromazine Hydrochloride .....	115	Floxuridine.....	183
Cidofovir .....	116	Fluconazole.....	184
Cimetidine Hydrochloride.....	117	Fludarabine Phosphate.....	186
Ciprofloxacin.....	119	Fluorouracil.....	187
Cisplatin.....	121	Foscarnet Sodium.....	190
Cladribine.....	123	Fosphenytoin Sodium .....	192
Clindamycin Phosphate.....	124	Furosemide .....	193
Clonidine Hydrochloride .....	126	Ganciclovir Sodium.....	194
Coagulation Factor VIIa Recombinant .....	128	Gemcitabine Hydrochloride .....	196
Coagulation Factor VIII .....	129	Gentamicin Sulfate.....	197
Coagulation Factor IX .....	133	Glycopyrrolate .....	199
Coagulation Factor XIII.....	135	Granisetron Hydrochloride.....	200
Colistimethate Sodium .....	136	Haloperidol Lactate.....	202
Co-Trimoxazole (Trimethoprim– Sulfamethoxazole) .....	137	Heparin Sodium.....	203
Cyclophosphamide .....	138	Hydralazine Hydrochloride .....	205
Cyclosporine .....	140	Hydrocortisone Sodium Succinate.....	206
Cytarabine .....	141	Hydromorphone Hydrochloride .....	207
Dacarbazine .....	143	Hydroxyzine Hydrochloride .....	209
Daclizumab.....	144	Ibuprofen .....	210
Daptomycin .....	145	Ifosfamide.....	211
Daunorubicin Hydrochloride (Daunomycin).....	147	Imipenem–Cilastatin Sodium.....	213
Deferoxamine Mesylate.....	148	Immune Globulin (Human).....	215
Dexamethasone Sodium Phosphate.....	151	Infliximab .....	218
Dimenhydrinate .....	153	Interferon alfa-2b.....	219
Diphenhydramine.....	154	Irinotecan Hydrochloride.....	220
DOBUTamine Hydrochloride .....	155	Ketamine Hydrochloride .....	221
Docetaxel.....	156	Ketorolac Tromethamine .....	223
Dolasetron Mesylate.....	157	Leucovorin Calcium .....	225
DOPamine Hydrochloride .....	158	Levofloxacin.....	227
Doripenem .....	159	Linezolid .....	228
Doxorubicin Hydrochloride.....	161	Lorazepam.....	229
Doxycycline Hyclate.....	164	Meperidine Hydrochloride.....	231
Enoxaparin Sodium.....	166	Meropenem .....	233
Epirubicin Hydrochloride.....	167	Mesna .....	236
Epoetin Alfa .....	168	Methadone Hydrochloride.....	238
Epoprostenol Sodium.....	169	Methotrexate Sodium .....	239
Ertapenem .....	171	Methylprednisolone Sodium Succinate.....	241
Erythromycin Lactobionate.....	172	Metoclopramide Hydrochloride.....	243
Ethanol (Catheter Lock).....	174	Metronidazole, Metronidazole Hydrochloride .....	245
		Micafungin Sodium.....	247

# Contents

## EXTENDED STABILITY FOR PARENTERAL DRUGS

Midazolam.....	248	Sufentanil Citrate .....	290
Milrinone Lactate .....	250	Telavancin .....	292
Mitomycin .....	252	Thiotepa .....	293
Mitoxantrone Hydrochloride .....	253	Ticarcillin Disodium–Clavulanate Potassium.....	294
Morphine Sulfate.....	254	Tigecycline.....	296
Nafcillin Sodium.....	258	Tobramycin Sulfate .....	297
Octreotide Acetate.....	260	Tocilizumab .....	299
Ondansetron Hydrochloride .....	261	Topotecan Hydrochloride .....	300
Oprelvekin (Interleukin-11) .....	264	Trastuzumab .....	301
Oxacillin Sodium.....	265	Treprostинil .....	302
Oxaliplatin.....	268	Valproate Sodium.....	303
Oxytocin .....	269	Vancomycin Hydrochloride.....	304
Paclitaxel.....	270	VinBLAStine Sulfate.....	306
Pantoprazole Sodium .....	272	VinCRIStine Sulfate .....	307
Peginterferon alfa-2a .....	273	Vinorelbine Tartrate .....	309
Pemetrexed Disodium .....	274	Voriconazole .....	310
Penicillin G Potassium .....	275	Ziconotide Acetate.....	311
Penicillin G Sodium .....	277	Zidovudine .....	313
Pentamidine Isethionate .....	278	Zoledronic Acid .....	314
Piperacillin Sodium–Tazobactam Sodium ....	280		
Prochlorperazine .....	282		
Quinupristin–Dalfopristin .....	283		
Ranitidine Hydrochloride.....	284		
Rituximab.....	286		
Ropivacaine Hydrochloride .....	287		
Sargramostim.....	289		
		<b>Part III</b>	
		<b>Appendix A:</b> Manufacturer and Compendium Abbreviations .....	317
		<b>Appendix B:</b> Glossary of Terms.....	321
		<b>Index</b> .....	323