smiths medical cadd[°]

Pharmaceutical report on chemical and physical stability of drugs commonly used with CADD[®] infusion pumps

Prepared by **Swayam Prabha, PhD MBA** Assistant Professor, College of Pharmacy, University of Minnesota

This following table is a compilation of third party studies concerning the stability of various medications in 50 mL and 100 mL CADD[™] Medication Cassette Reservoirs. This is intended as a reference guide only. The selection of the appropriate medication, concentration and dose is the sole responsibility of the healthcare professional. Note: ICH guidelines were used to calculate the time that the drug retained the concentration within 90-110% of label claim. Per ICH guidelines any evaporation that resulted in more than a 10% increase in drug concentration was considered to be detrimental for the product and hence accordingly the stability specifications were set at within 90-110% of label claim.



			Stability Conditions				
Antibiotics	Diluent	Concentration	RT (15 – 30 °C)	Refrigerated (2 – 8 °C)	Freezer (-20 °C)	Reference	Comments
Ampicillin Sodium	SWFI NS	60 mg/mL 60 mg/mL	1d ¹ 1d ¹	1 d ¹ 1 d ¹		[1]	Limited data
Ceftazidime (with arginine)	SWFI	30 mg/mL 60 mg/mL		10d 10d	30d 30d	[2]	Samples stored at -20 °C were stable for 4d at 3 °C
Cefuroxime Sodium	SWFI	30 mg/mL 60 mg/mL 22.5 mg/mL 45 mg/mL		7d 7d	30d 30d	[2]	Samples stored at -20 °C were stable for 4d at 3 °C
Doxycycline Hyclate	SWFI NS	2 mg/mL 2 mg/mL	6 hrs ¹ /12 hrs ² 6 hrs ¹ /12 hrs ²	1d 1d		[1]	
Erythromycin Lactobionate	SWFI NS	20 mg/mL 20 mg/mL	1 d 1 d	1d 1d		[1]	
Meropenem	NS	30 mg/mL	28 hrs			[30]	Variable data and limited data with 2 out of 4 cassettes demonstrated concentrations out of range
Nafcillin Sodium	SWFI NS	20 mg/mL 80 mg/mL 120 mg/mL	3d 2d 3d	14d 1d 14d		[5] [1] [5]	
Oxacillin Sodium	SWFI	120 mg/mL	7d	14d		[5]	
Penicillin G Potassium	SWFI	100,000 units/mL 200,000 units/mL	3d 3d	- 14d		[5]	
Penicillin G Sodium	SWFI	100,000 units/mL 200,000 units/mL	3d 3d			[5]	
Tobramycin Sulfate	NS	1 mg/mL 10 mg/mL	3d 3d	14d 14d		[5]	
Vancomycin Hydrochloride	NS SWFI	10 mg/mL 10 mg/mL	1d 1d	1d 1d		[1]	

1. With insulated pouch to help maintain temperature of cassette.

2. Without insulated pouch.

Analgesics/Anesthetics

			Stability Conditions				
Analgesics/ Anesthetics	Diluent	Concentration	RT (15 – 30 °C)	Accelerated Conditions (35 °C)	Refrigerated (2 – 8 °C)	Reference	Comments
Bupivacaine Hydrochloride	NS	0.125% 0.5% 0.75%	4d 7d 50d		7d 7d 50d	[6] [6] [7]	
Bupivacaine Hydrochloride and Morphine	undiluted	2 mg/mL	30d			[8]	
Bupivacaine Hydrochloride and buprenorphine	undiluted	4 mg/mL/ 0.015 mg/mL	30d			[8]	
Bupivacaine Hydrochloride and Fentanyl Citrate ³	NS	0.125% 20 µg/mL	30d		30d	[9]	
Bupivacaine Hcl, Fentanyl Citrate and Epinephrine	NS	1 mg/mL 2 µg/mL 2 µg/mL	184d		184d	[10]	
Fentanyl Citrate	NS NS	20 µg/mL 50 µg/mL	30d 14d		30d 14d	[11] [12]	
Hydromorphone Hydrochloride and Morphine Sulfate	NS D5W NS D5W	1 mg/mL 5 mg/mL 50 mg/mL 10 mg/mL 5 mg/mL 10 mg/mL	42d 42d 42d 30d 30d		42d 42d 42d 30d 30d	[13]	

3. No polypropylene-mylar overwraps required

Analgesics/Anesthetics

				Stability Conditions			
Analgesics/ Anesthetics	Diluent	Concentration	RT (15 – 30 °C)	Accelerated Conditions (35 °C)	Refrigerated (2 – 8 °C)	Reference	Comments
Meperidine HCl	SWFI	15 mg/mL		9d	14d	[14]	
Meperidine and Clonidine	NS	8 mg/mL/3 µg/mL	21d			[15]	
Morphine HCl	SWFI NS	10 mg/mL 0.5 mg/mL 1.5 mg/mL 2.5 mg/mL	- 60d 60d 60d	9d	14d	[16,17]	
Morphine Hydrochloride, Bupivacaine HCl and Clonidine HCl	Undiluted	6.66 mg/mL 3 mg/mL 30 μg/mL	90d			[7]	
Morphine Sulfate	NS NS Undiluted Undiluted	1 mg/mL 5 mg/mL 15 mg/mL 25 mg/mL	30d 30d 30d 30d	14d	30d 30d 30d 30d	[18]	
Morphine Sulfate	Undiluted Undiluted	25 mg/mL 50 mg/mL	31d 31d		31d 31d	[19]	Tested with and without preservative. Presence of preservative had no apparent effect on the stability
Sufentanil Citrate	NS	50 µg/mL	14d			[12]	

Antineoplastics

			Stability Conditions				
Antineoplastics	Diluent	Concentration	RT (15 – 30 °C)	Accelerated Conditions (37 °C)	Refrigerated (2 – 8 °C)	Reference	Comments
Carboplatin	D5W undiluted	6 mg/mL 10 mg/mL		28d 28d		[20, 21]	Degradation reported at 60 °C
Cisplatin	NS- Mannitol	1 mg/mL 1.6 mg/mL	14d	14d		[22]	Significant fluid loss at 60 °C
Cladribine	NS	1 mg/mL	7d			[23]	
Cyclophosphamide	SWFI	20 mg/mL		14d		[3]	Samples stored at 35 °C were stable for 1d
Cytarabine	NS	20 mg/mL		12d		[4]	Samples stored at 35 °C were stable for 8d
Doxorubicin Hydrochloride	NS	2 mg/mL	14d		14d	[24]	Solutions stored at 3 or 23 °C were stable for additional 28d at 30 °C
Fluorouracil	NS/ D5W Undiluted	50 mg/mL	14d4	7d	5d	[26]	

4. PVC reservoirs, CADD[™] Medication Cassette Reservoirs at 33°C

Miscellaneous

			Stability Conditions				
Miscellaneous	Diluent	Concentration	RT (15 – 30 °C)	Accelerated Conditions (37 °C)	Refrigerated (2 – 8 °C)	Reference	Comments
Coagulation Factor VIIa Recombinant	SWFI	15000 units/mL	Зd			[28]	
Deferoxamine Mesylate	SWFI	210 mg/mL 370 mg/mL	8d			[25]	Chemically stable for 17-21d
Heparin		5000 units/mL		10d	7d	[29]	Water evaporation evident at 37 °C
Ondansetron HCl	Undiluted NS	2 mg/mL 0.24 mg/mL	7d 24 hrs		30d	[27]	
Treprostinil sodium	SWFI NS/D5W D5W	0.004 mg/mL 0.13 mg/mL 0.02 mg/mL		2d 2d 2d		[31]	Accelerated conditions tested were 40 °C and 75% Relative humidity

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