

# Thermal kinetic estimation of reconstitution solvents for injectable chemotherapy

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## INTRODUCTION

The time between preparation and administration of drugs in a centralized anticipated chemotherapy preparation ward raises the question of controlling storage conditions in care units. Most of preparations need to be kept in a refrigerated environment and require a time to return to ambient temperature depending on the duration of cold storage before administration. For this, it is essential to know the inertia of the rise or drop in temperature of the preparations. In the same time, with an internal practice audit targeting the circuit and the methods of conservation of chemotherapy in the units, we have undertaken a **study to evaluate the kinetics of temperatures during the change of thermal environment, in ambient environment (above 15 ° C) or refrigerated (2-8 ° C), depending on the solvent and its volume.**

## MATERIALS AND METHODS

- Temperature kinetics were done with **G5%** and **NaCl 0.9%**
- Over 3 consecutive days, on 3 copies of each volume of container :
  - polypropylene bags of 50, 100, 250, 500 and 1000mL** (Freeflex®, Fresenius Kabi)
  - syringes (BD) of 3, 20 et 50mL**
- Temperature was evaluated using an **infrared thermometer** (Testo), **at regular intervals every 15 minutes for 2 hours**, by a single operator
- Two different kinetics were studied :
  - the rising of temperature of a refrigerated solvent** placed in an ambient environment
  - the temperature drop of the solvent** at ambient temperature and placed at refrigerated temperature

## RESULTS

During the thermal descent kinetics, the temperature of the refrigerator was 5.7 ° C on average [4.5 ° C ; 7.9 ° C]. During the thermal rise kinetics, the ambient temperature was 24 ° C [23.7 ° C ; 24.9 ° C].

		syringes			bags				
		3ml	20ml	50ml	50ml	100ml	250ml	500ml	1000ml
Average time interval to reach ambient temperature (>15°C)	Nacl 0,9%	15 min	30 min	30 min	30 min	45 min	1h	1h15	1h15
	Glucose 5%	30 min	30 min	45 min	45 min	1h15	1h30	1h30	2h
Average time interval to reach refrigerated temperature (<8°C)	Nacl 0,9%	1h45	1h45	1h45	30 min	45 min	1h15	>2h	>2h
	Glucose 5%	1h30	1h30	2h	30 min	45 min	1h15	>2h	>2h

## DISCUSSION/CONCLUSION

NaCl and glucose follow a similar kinetic profile of temperature variations mainly influenced **by the temperature of the surrounding environment**, but also by **the volume of the solvent and the thickness of its container**, showing a slower temperature drop kinetics for the syringes than for the bags.

→ **Regardless of their final reconstitution volume, refrigerated chemotherapies should be placed in ambient environment at least 30 minutes before administration to the patient to ensure proper infusion practices are followed.**