



**PLUSS<sup>®</sup>**

TECHNOLOGY FOR  
A BETTER WORLD

Phase Change Materials  
For Pharmaceutical Application

# WHY PCMs IN PHARMA

- Stringent Standards of Monitoring temperature during transit.
- Service Quality.
- Ever Increasing Customer Expectation.
- Minimize the effect of external conditions on the quality and stability of the product.

# WHY PCMs

Different PCM to maintain different temperatures without external source.

- **33°C** to **+89°C**

## Conventional solutions

- Ice or water based gels
- Glycol based solutions
- Dry Ice



**Only two temperatures,  
0°C and -80°C**

# WHY PCMs

- Dry Ice causes shrinkage of rubber stoppered vials.
- Dry Ice has been declared as hazardous material by International Air Transport Authority.
- Dry Ice sublimation in a sealed container can cause explosion and CO<sub>2</sub> rich atmosphere affects many product's quality.
- Temperatures of eutectic solution such as glycol + water mixture vary between a large bandwidth.

# WHY PCMs

- Recyclable - Upto 3000 cycles - Reusability
- Maintains constant temperature throughout melting cycle - Precision
- High thermal energy storage capacity - More Energy per Weight of PCM
- Longer Shelf Life than traditional coolants - Cost Effective

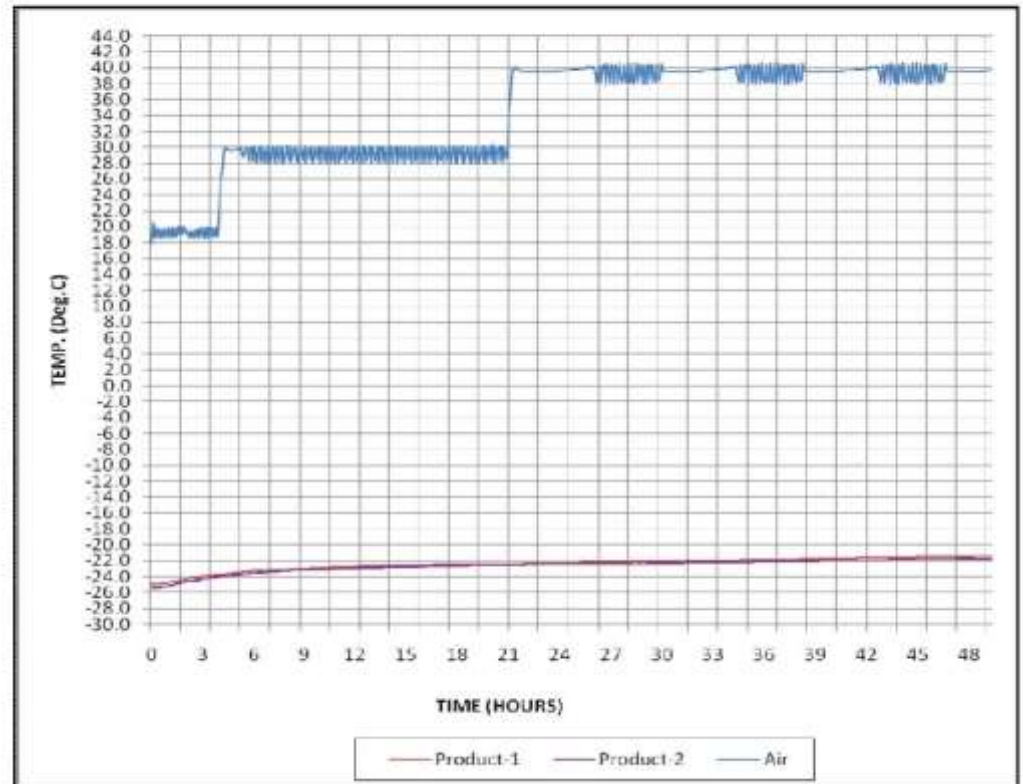
# HOW IS PCM APPLIED

## Identifying the right temperature PCM

Example: A  $-23^{\circ}\text{C}$  PCM can be used in application requiring temperature control in the range of  $-20^{\circ}\text{C}$  -  $22^{\circ}\text{C}$  consistently for 48 hours.

Data Summary: Test Result = Temperature maintain for NLT 48 Hrs.

AS 013: AS-SAFE-7L/  $-20^{\circ}\text{C}$ / Summer Profile



# HOW IS PCM APPLIED

## List of PCM relevant to Pharma application.

Product	Operating Temperature (°C)	Latent Heat (KJ/Kg)	Application
HS 26N	-26	205	Fresh Frozen Plasma
HS 23N	-23	200	Blood serum, protein, Plasmids, DNA, RNA, Anti Sera samples
HS 10N	-10	220	Tissues on slides
HS 7N	-7	230	Tissues on slides
Frost	0	290	Vaccine, Insulin, Blood Products.
HS 22	22	185	Blood platelets

\* Other temperatures are also available

# HOW IS PCM APPLIED

Heat load is calculated to establish the amount of PCM required factoring,

- Ambient temperature
- Infiltration
- Specification of insulation
- Duration of backup required

