

Nickel Hydrogen Battery Cell Storage Matrix Test

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FILE: STORE05.XLS

Objective

Evaluate post storage performance of Nickel-Hydrogen cells with various design variables, the most significant being nickel-precharge versus hydrogen-precharge.

FILE: STORE006.XLS

STORAGE MATRIX --- BATTERY CELL CONFIGURATION										
GROUP	POSITIVE	SEPARATOR	WALL	CATALYZED	PRECHARGE	FINAL	DESIGN			
N°	LOT	TYPE*	WICK (Yes/No)	WICK (Yes/No)	TYPE (Ni/H2)	ELECTROLYTE (%)	PRESSURE** (PSIG)			
1	X	ZZ	Yes	No	Ni	31	700***			
2	X	AZ	Yes	Yes	Ni	31	700***			
3	Y	A	No	-	H2	36	600			
4	Y	A	No	-	Ni	36	500***			

NOTES:

* Z = Zircar, A = Fuel Cell Grade Asbestos

** Maximum pressure AFTER Nickel Precharge.

FILE: STORE001.XLS

STORAGE MATRIX --- BATTERY CELL TEST HISTORY		
GROUP	DURATION	EVENT
N°	(Months)	DESCRIPTION
1,2	0.75	Activation and Conditioning
1,2	0.75	Acceptance Testing (2 standard cycles + 16 high-rate cycles)
1,2	1	Stored, room temperature, discharged, open-circuit
1,2	5	Stored, 5°C ± 3°C, discharged, open-circuit
1,2	0.25	Wake-up cycles (2 standard cycles)
1,2	0.75	Demonstration testing (8 high-rate cycles)
3,4	0.75	Activation and Conditioning
3	0.75	Acceptance Testing (11 cycles)
1,2,3,4	1	Baseline Testing (9 cycles)
1,2,3,4	9	Stored, room temperature, discharged, open-circuit
1,2,3,4	1	Post-storage Testing (9 cycles)

FILE: STORE302.XLS

Common Design Features

- 65 AH rated capacity
- 48 ea, .030" slurry nickel electrodes, 80% porosity, aqueous electrochemical impregnation
- "Mantech" configuration (internal electrode leads)
- Axial Terminals

FILE: STORE007.XLS

STORAGE MATRIX --- PHASE 1 STORAGE TEST			
GROUP N°	ATP* Capacity (AH)	Wake-up** Capacity (AH)	Capacity Increase (AH)
1	78.9	81.6	2.7
2	79.8	81.0	1.2
* ATP cycle prior to before storage:			08/23/90
** Wake-up cycle performed:			03/07/91

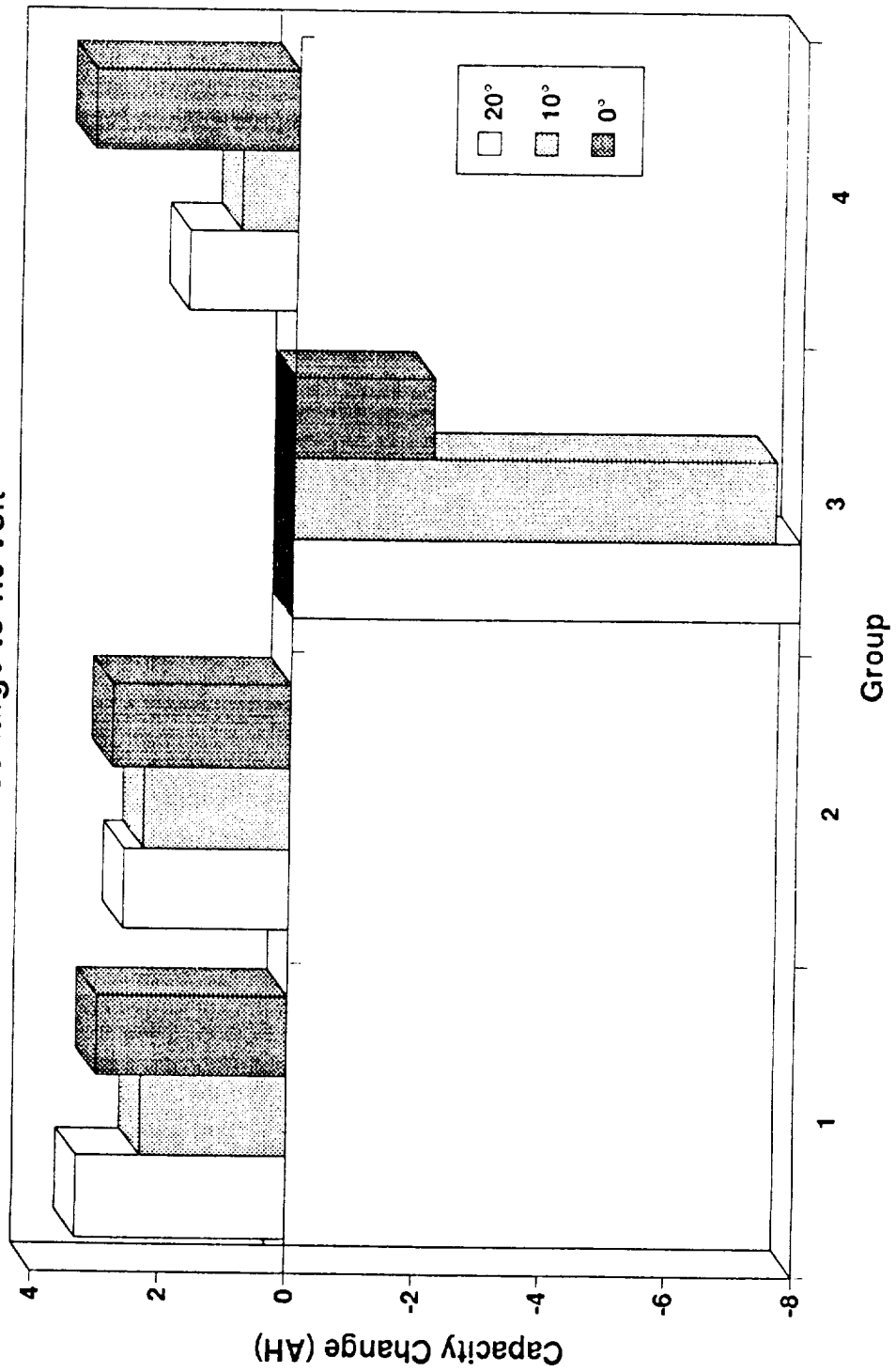
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STORAGE MATRIX --- PHASE 2 STORAGE TEST				
GROUP N°	20°C Increase (AH)	10°C Increase (AH)	0°C Increase (AH)	
Discharge to 1.0 volt				
1	+3.3	+2.3	+3.0	
2	+2.6	+2.3	+2.8	
3	-8.0	-7.6	-2.2	
4	+1.7	+0.9	+3.2	
Discharge to 1.1 volt				
1	+3.3	+2.3	+3.6	
2	+2.7	+2.4	+3.0	
3	-6.5	-3.6	+5.1	
4	+2.3	+2.3	+6.4	

FILE: STORE004.XLS

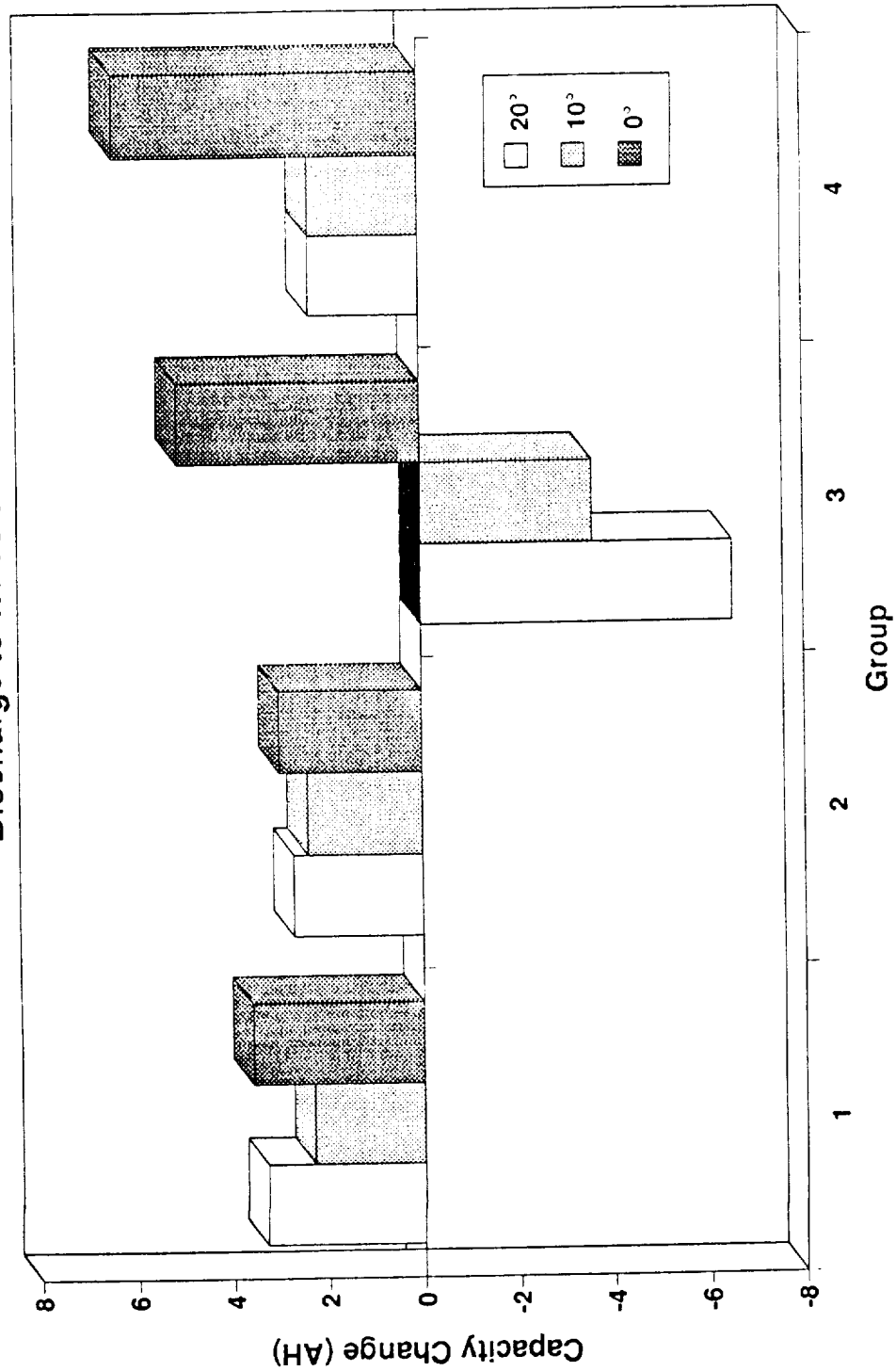
Nickel Hydrogen Cell Storage Test

Discharge to 1.0 volt



Nickel Hydrogen Cell Storage Test

Discharge to 1.1 volt



Conclusions

- Hydrogen precharged cells are more susceptible to post storage loss of performance than nickel precharged cells.
- Room temperature storage is more degrading than low temperature storage.

FILE: STORE008.XLS