Table 3 : Third Measured and Calculated Values for GBM model battery.

$H_d(T)$	V_{ac} (V)	V_{dc} (V)	I_{ac} (A)	I_{dc} (A)	T (˚C)	PL= $I_{0dc} \times V_{0dc} - I_{0dc} \times V_{dc(W)}$	$\eta_o = \frac{Vdc}{Vo} \frac{V_{dc}}{V_0}$	$E_o = V_{o\,(V)}$	$E_d = \frac{IoVo - IdcVdc}{Idc}$	S = Q/T	ΔT	WHr
0.00	238	11.3	0.84	20.80	35.30	235.00	0.83	13.65	54.33	0.00	0.00	0
0.25	240	10.9	0.83	25.23	73.30	275.00	0.80	13.65	43.20	3.36	20.48	68.75175
0.50	241	10.7	0.83	27.57	55.30	295.00	0.78	13.65	38.81	3.73	39.50	147.4995
0.75	242	10.6	0.83	27.77	57.00	305.00	0.78	13.65	38.55	3.76	58.75	220.7715
1.00	236	10.3	0.85	32.52	33.10	335.00	0.75	13.65	31.67	4.57	73.37	334.956

The average entropy value, S, for GBM Lead Acid battery for the third cycle is thus, **3.08J/K.**

Figure 7 shows the behaviour of GBM Lead acid battery during discharge. The figure illustrates ΔT against WHr for the third cycle.

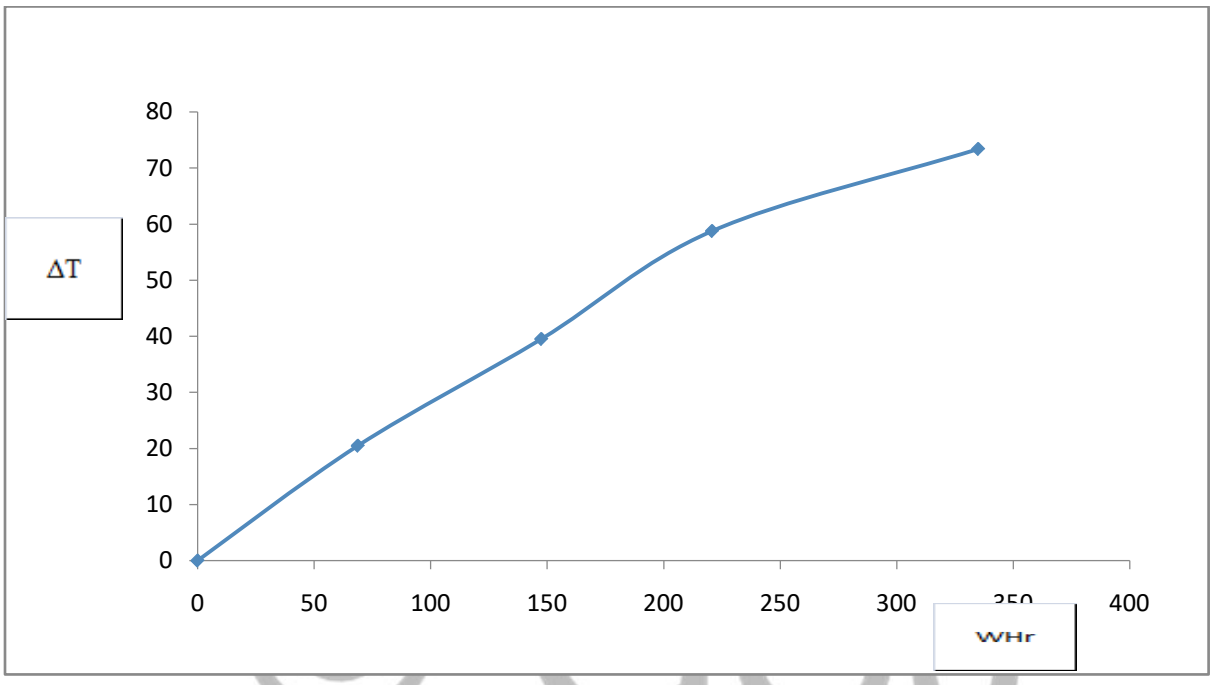

Figure 7**:** ΔT - Whr curve for third cycle.

The temperature of the battery rises as the watt – hour of discharging increases in Figure 7. Hence, the total average value of the entropy, S, for GBM model battery is **2.93J/K.**

The same procedures of determining entropy heating values were applied to other models of the batteries, viz; **CRYSTAL PLUS, SUNFIT , ROCK , GBM , EXCLUSIVES and POWER WAVES.**

The average entropy values, S, for the six different battery models available in the market, under consideration; **CRYSTAL PLUS, SUNFIT, ROCK , GBM , EXCLUSIVES**

and POWER WAVES are **1.97J/K, 2.18J/K, 2.40J/K, 2.93J/K, 3.11J/K and 3.13J/K** respectively.

The average entropy heating value, S, for all the considered models of deep cycled Lead acid batteries is thus **2.62J/K.**

4.0 Conclusion

Determination of entropy heating value of deep cycled Lead acid batteries in terms of adiabatic temperature rise during discharge has been done. The materials used for this study were a 250 watts Monocrystalline solar module for charging the battery, a digital multimeter for measuring DC and AC voltage, an inverter for the conversion of DC voltage to AC voltage, a timing device, 200 watts bulb for discharging the battery, six 12Volts deep cycled Lead acid batteries (**Crystal Plus, Sunfit, Rock , GBM , Exclusives and Power Waves**), and a digital thermometer for temperature readings.

The study shows that the adiabatic temperature rises inside the battery as the battery discharges continuously. And the discharges result into power loss from the battery. Also, the frequent charging of the battery reduces the life cycle of the battery.

The average entropy values, S, for the six different battery models available in the market, under consideration; **CRYSTAL PLUS, SUNFIT, ROCK , GBM , EXCLUSIVES and POWER WAVES** are **1.97J/K, 2.18J/K, 2.40J/K, 2.93J/K, 3.11J/K and 3.13J/K** respectively.

The average entropy heating value, S, for all the considered models of deep cycled Lead acid batteries is thus **2.62J/K.**

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