

## Study of Electrical Properties of Glue Used in Fabrication of Large Bakelite Resistive Plate Chamber

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### Introduction

Resistive Plate Chamber (RPC)[?] is one type of gas filled detector which utilizes a constant and uniform electric field maintained between two high resistive parallel electrode plates e.g. glass, bakelite. Glue is an important component used during the fabrication of a RPC. The electrical and mechanical properties of the glue plays important role in the functioning of a RPC. It provides mechanical support to the electrodes of RPC to maintain a finite uniform gas gap. It helps in controlling the leakage current between the to electrodes of RPC. It also confirms that the gas gap is leak tight.

### Making of different glue samples

We have used glue to paste the button spacers which maintain nearly an uniform gap between the two electrodes and to paste the side spacers which also maintained an uniform gap between the two electrodes as well as makes sure that the RPC was leak tight. We used 128 button spacers of (1.5cm × 1cm × 0.2cm), 6 side spacers of ~80 cm each, 8 gas nozzles (4 for gas input and 4 for gas output) and 2 side spacers of ~120cm. Then we applied glue on the top surface of all the spacers and the second bakelite sheet was placed. Since the glue used contributes to the leakage current of the RPC, the conductivity of the glue used should be much less than that of the electrode else the leakage current of the RPC will be high. We made different glue samples of certain dimension by mixing different kinds of resins and hardners in various combinations and propor-

Glue sample	Resin Specifications	Hardner Specifications
Sample-1	Dobekot 520F	Hardner 758
Sample-2	Araldite	Araldite hardner
Sample-3	Dobekot 520F	Hardner 758
Sample-4	Dobekot 520F	Fevitite hardner
Sample-5	Bicron BC-600	Hardner 758
Sample-6	BC-600:Araldite::1:1	BC-600 hardner

TABLE I: Resin and hardner specifications of different glue samples.

Glue sample	Resin:Hardner
Sample-1	1.0 : 0.8
Sample-2	1.0 : 1.0
Sample-3	11.0 : 1.0
Sample-4	21.0 : 2.0
Sample-5	1 : 1
Sample-6	4:1

TABLE II: Mixing ratios (by mass) of resin and hardner for different glue samples.

tions (by mass). We studied the leakage current through various glue samples and hence their bulk resistivity. Table 1 shows the different types of resins and hardners used to make the glue samples. Table 2 shows the mixing ratio (by mass) of resin and hardner to make different glue samples and table 3 shows the dimensions of the various glues samples made.

### Results

Figure 1 shows the measured bulk resistivity of various glue samples made and table 4 summarizes those measurements. Among all the samples, bulk resistivity of the mixture of sample 6 was found suitable as its bulk resistivity was found to be ~100 [?] times higher than the bakelite bulk resistivity. Hence this

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Glue sample	Sample dimensions (cm <sup>3</sup> )
Sample-1	2.50 × 2.50 × 0.237
Sample-2	2.10 × 2.15 × 0.240
Sample-3	1.73 × 1.63 × 0.241
Sample-4	1.75 × 1.75 × 0.240
Sample-5	1.5 × 0.90 × 0.210
Sample-6	2.10 × 1.80 × 0.210

TABLE III: Resin and hardner specifications of different glue samples.

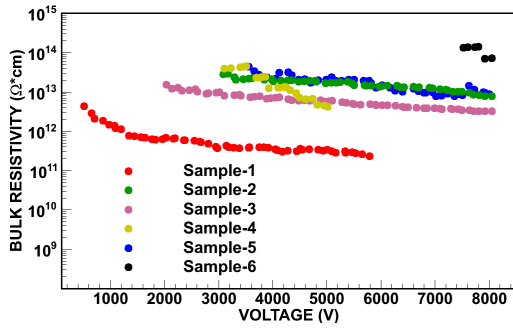


FIG. 1: [Color online] Bulk resistivity of different glue samples as a function of applied voltage.

particular glue was used to fabricate the RPC.

### Conclusion

To conclude, the bulk resistivity of sample 6 was found satisfactory. Hence this particular glue was used to fabricate a large size bakelite RPC of dimension (240cm × 120cm × 0.2cm).

Glue sample	$\rho$ ( $\Omega\text{cm}$ )
Sample-1	$\sim 6.773 \times 10^{11}$
Sample-2	$\sim 2.164 \times 10^{13}$
Sample-3	$\sim 8.376 \times 10^{12}$
Sample-4	$\sim 2.014 \times 10^{13}$
Sample-5	$\sim 6.62 \times 10^{12}$
Sample-6	$\sim 1.157 \times 10^{14}$

TABLE IV: Bulk resistivity of different glue samples.  $\rho$  is the bulk resistivity.

### References

- [1] R. Santonico R.Cardarelli, Nucl. Inst. and Meth. 187, (1987) 331.
- [2] Proceedings of the DAE Symp. on Nucl. Phys. 59 (2014).