

Title

Canopin, C.M., De Jesus F.M.Z., Higuit, I.R.M., Jastilliana, J.K.G., Secapurri, E.N., Tiongson, E.V.S., Rubi, R.V.C.
Chemical Engineering Department, College of Engineering Adamson University, 900 San Marcelino St. Ermita
1000 Manila

INTRODUCTION & AIM

Cotton is mainly used in textile industries which include fabrics, clothing, production of explosives and oils. It has a high cellulose content up to 99%-w. With this, cotton can be used as a source of raw material in synthesizing a superabsorbent polymer.



Figure 1. Cotton waste

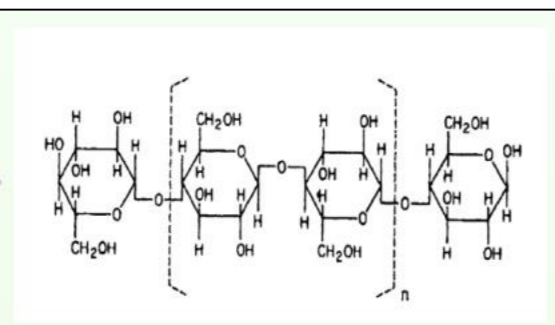
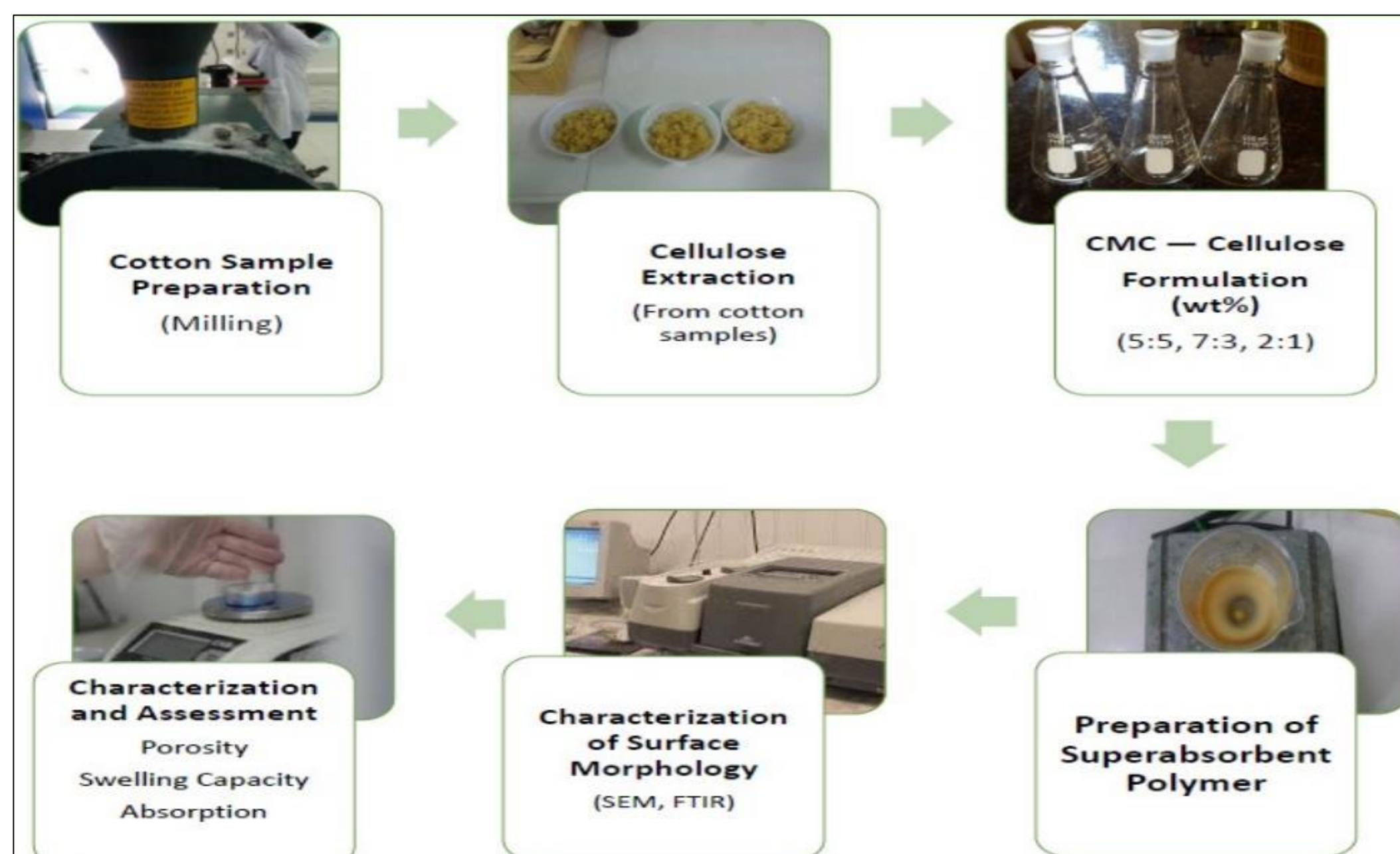


Figure 2. Cellulose Structure

- Super absorbent polymers (SAP) are a particular class of polymers that absorb large quantity of water and more than that of a typical absorbent material.
- Most widely used SAP materials are made up of acrylic acid and acrylamide-based (synthetic) products because of their superior price to performance balance.
- Carboxymethyl cellulose (CMC) in particular, is one of the components in synthesizing (natural) based SAP. It is a cellulose derivative formed by chemical modifications of natural cellulose. But CMC in general has low decomposition resistance when exposed in environmental conditions.

METHOD



SAP RATIO	3%wt CMC (g)	3%wt Cellulose (g)	Cross-linking Agent (mL)	Duration (hours)	Temperature (°C)
7:3	21	9	3	12	60
2:1	20	10	3	12	60
5:5	15	15	3	12	60

Table 1. CMC – Cellulose solution ratios with the other parameters; time, temperature and the cross-linking agent.

RESULTS & DISCUSSION

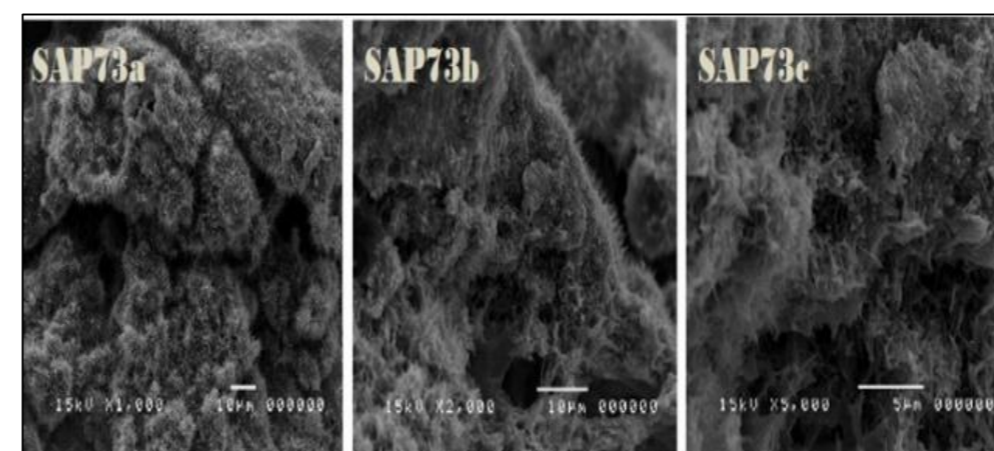


Figure 3. SEM image of SAP (7:3) sample at 1000,2000, and 5000 magnification respectively

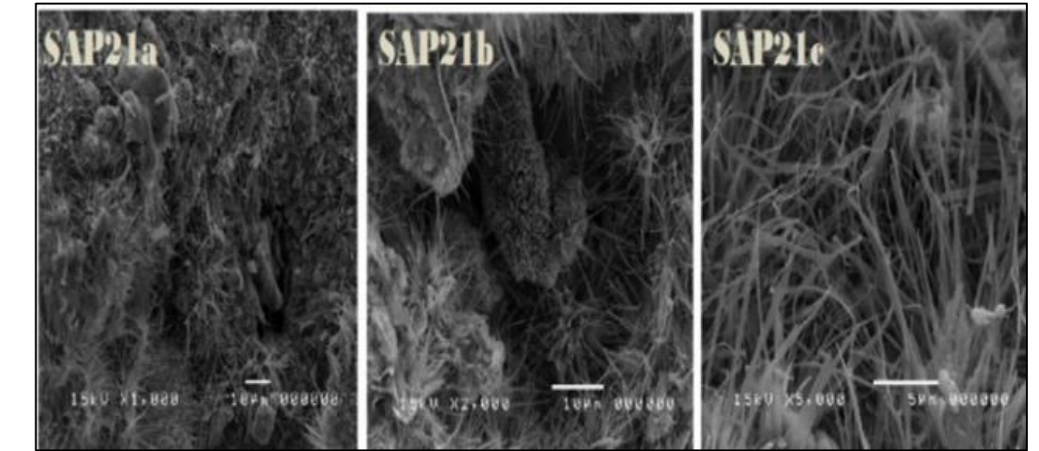


Figure 4. SEM image of SAP (2:1) sample at 1000,2000, and 5000 magnification respectively

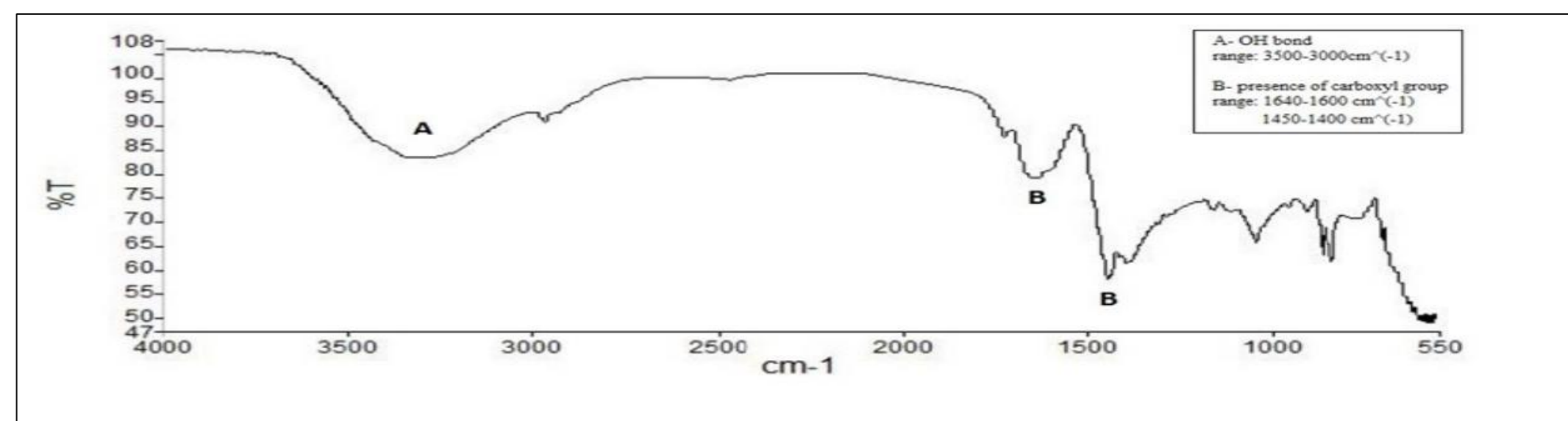


Figure 5. FTIR analysis of SAP (7:3)

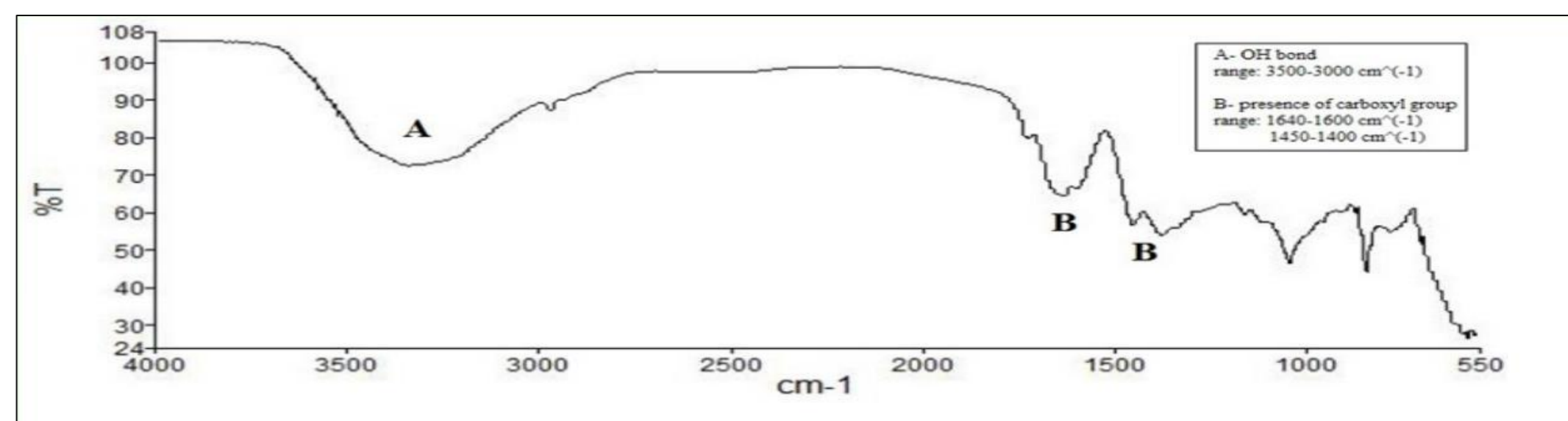


Figure 6. FTIR analysis of SAP (2:1)

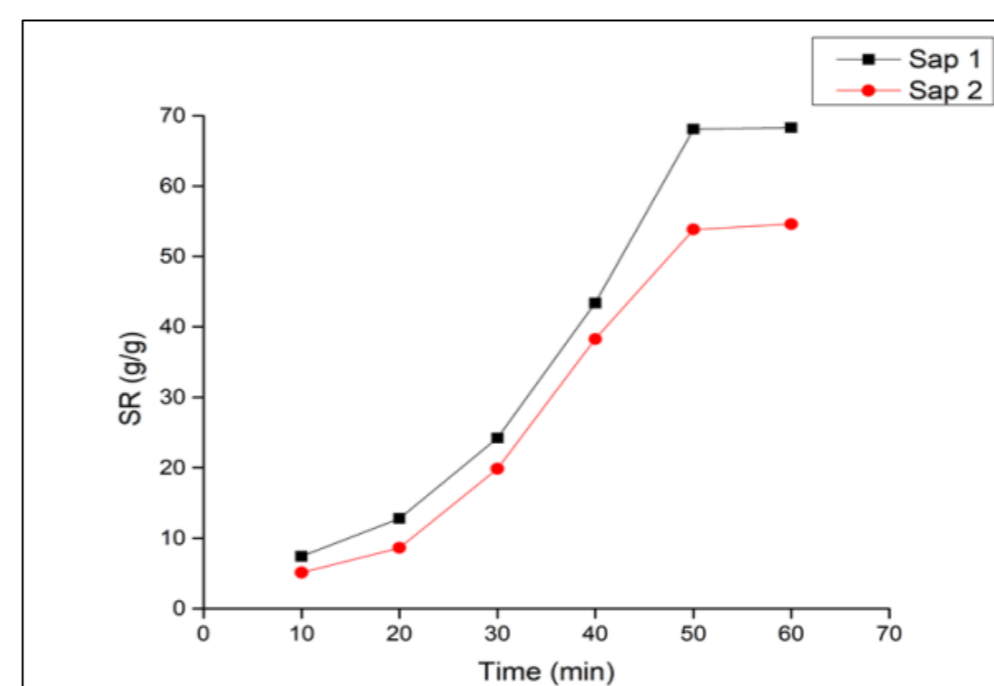


Figure 7. Swelling ratio (g/g) vs Time (min) of SAP 1 (7:3) and SAP 2 (2:1)

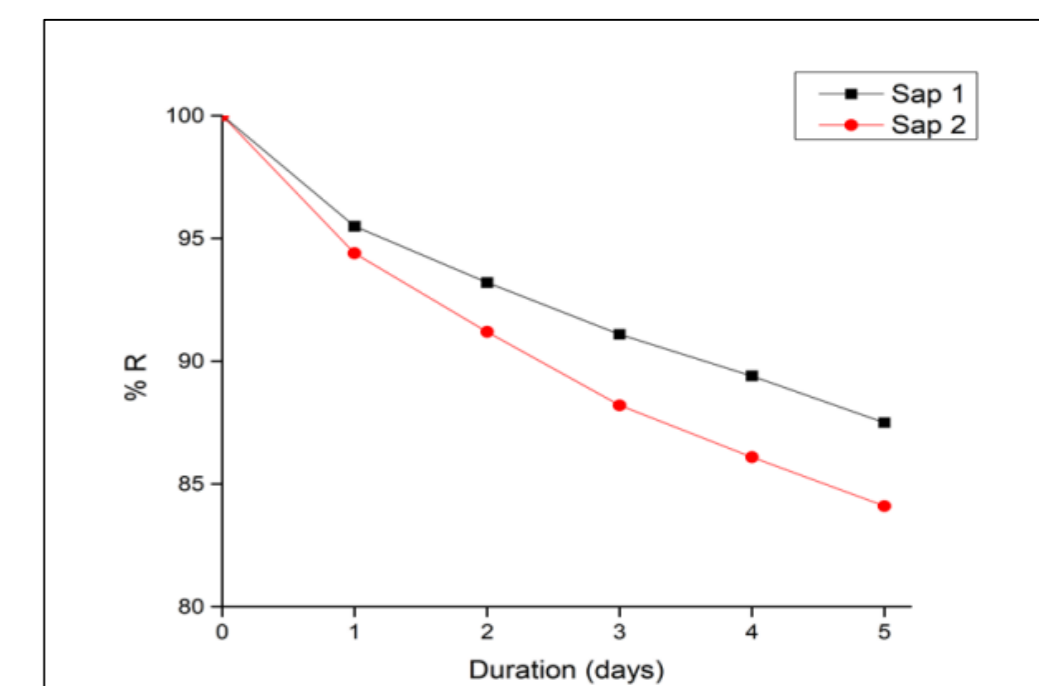


Figure 8. Percent Retention vs Time (days) of SAP 1 (7:3) and SAP 2 (2:1)

CONCLUSION

- Citric acid is a good cross-linking agent
- Surface porosity of the SAP increases as the concentration of CMC increases
- Higher concentration of CMC than Cellulose will produce SAP with a higher absorption and retention rate

FUTURE WORK / REFERENCES

- Conduct further testing to ensure comprehensive analysis
- Explore other applications in the biomedical field
- Ensure polymeric stability to ensure long term effectivity