# Synthesis and characterization of gamma radiation induced (3-Acrylamidopropyl) trimethylammonium chloride-Acrylic acid superabsorbent hydrogel.

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# Introduction

The Superabsorbent hydrogel is a polymeric network which can retain water more than 100 times of its dried weight. Large swelling is due to the presence of hydrophilic functional groups such as- -COOH,  $-NH_2$ , -OH etc. in the network. The greater number of those functional groups in hydrogel, the larger swelling capacity<sup>1</sup>. Owing to the superabsorbency and non-toxicity they have been widely used in drug delivery, tissue engineering, immobilization of protein and cells, agriculture and sanitary products<sup>2</sup>. In the present work, authors report on the synthesis and characterization of (3-Acrylamidopropyl) trimethylammonium chloride (APTAC)-acrylic acid (AAc) hydrogel by gamma irradiation where no cross-linking agent and initiator is used.

## Experimental

6.67mL 75% aqueous solution of APTAC was taken in a beaker and then 5mL acrylic acid added dropwise with stirring. Total solution was made 50mL by adding ultrapure water to make APTAC: AAc ratio 1:1. The mixed solution was taken in the glass tube and irradiated at different radiation doses from Co-60 gamma source. The resultant gels were cut into small pieces and extracted in water at 50°C temperature for 24 hrs.

#### **Result and Discussion**

Figure 1 shows the equilibrium swelling of APTAC-AAc hydrogels with respect to different radiation doses from 5kGy to 20kGy. The equilibrium swelling decreases with increasing radiation dose which may be due to more cross-linking and grafting among monomers. FTIR spectrum reveals the characteristic peaks corresponding to the functional groups belonging to the hydrogel. Differential scanning calorimetry (DSC) confirms that the hydrogel is mechanically stable to use in various fields. SEM image clearly represents the void space of hydrogels where it retains a large amount of water through hydrogen bonding between water and functional site of gel. Therefore, we think that APTAC-AAc hydrogel can be used as drug carrier or adsorbent and we are currently conducting detailed studies.



Fig. 1 Effect of radiation dose on equilibrium swelling.

## References

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