

## Alginate Free Films: Cross-linking with Strontium Carbonate

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### Abstract

**Introduction:** Alginates are non-toxic, hydrophilic, biocompatible, biodegradable and low cost polymers which make them suitable for many biomedical applications. Due to their good tissue compatibility, they have been widely used in enhancing the healing process. However, they have limitations in mechanical characteristics and drug release. Adding metal ions could add some features to these films in order to improve their properties.

The purpose of this study is to compare alginate blend films cross-linked with different concentrations of strontium in order to submit one as the best in topical applications.

**Methods and Results:** Sodium alginate (2 g/100 g) was first dissolved in 50 mL de-ionized water. Di butyl phthalate (16% w/w) was added as plasticizer. After dissolution, the solution was poured into Petri dishes and dried at 40°C for 24 h. Alginate films were chemically cross-linked by immersing in different concentrations of strontium carbonate (0.1-1-10% w/v) for 1 minute. The films were then dried at oven at 40 °C for 24 h. The swelling test was performed in acidic (HCl 0.1N) and phosphate buffer media (pH=6.8) for 90 minutes.

Thickness of alginate film before and after the strontium crosslinking procedure was 0.178mm and 0.26 mm, respectively. Swelling index (IS) in acid and buffer media was 280.70% and 263.64%, respectively.

**Conclusions:** The swelling test of cross-linked films has demonstrated satisfying results by increasing in swelling properties, hence promising outcome for wound healing conditions. Also, the results showed pH-responsive swelling behaviors with surprisingly more swelling in acidic media compared to buffer.

**Key words:** Alginate, Strontium, Strontium Carbonate, Cross-linking.