

Thesis Title                      Removal of Fluoride in Drinking Water by Shell  
   of Swimming Crab (*Portunus Pelagicus*) and Shell  
   of Carper Shell. (*Paphia Undulata*)

Name                                  Veerapong Asirapongporn.

Degree                                Master of Science. (Public Health)

Thesis Supervisory              Committee

   Associate Professor Dr. Komol Sivaborvorn.

   Associate Professor Dr. Prathip Phantumvanit.

   Assistant Professor Vajira Singhakajen.

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### Abstract

The objectives of this study were to search for the suitable composition of synthetic filtering media made of ground calcined Swimming Crab and Carper Shell and their efficiencies in removal of fluoride in drinking water. In the synthesis of filtering media, the shell of Swimming Crab and Carper Shell were calcined at 400 °c for 6 hours and then ground. The ground calcined shells were mixed with binder, such as thin soil, Maetan-soil and some conditioning agents at different percentages, granulated in 5 - 10 mesh sizes and then heated. Two types of calcined shell granules were used as filtering media. In the study of the efficiency of these synthetic media, fluoridized water concentration at 3.31 and 4.61 ppm. were prepared. Two filtering medias were packed in the four glass columns diameter 2.5 cm separately with 15 and 30 cm. heights. Two filtering flow rates were tested at 0.5 and 1.0 gpm/ft<sup>2</sup> (10.3 ml./min and 20.6 ml./min) the filtrate were collected hourly for ten hours continuously and then the concentration of fluoride in the filtrates were analysed by Ion Selective Electrode

Method. Total 16 experiments and 160 water samples were tested. It was found that the suitable composition of two synthetic medias were, for Swimming Crab Shell granule composed of 70% of ground calcined shell and 30% of thin soil then heated at 1250 °c for 8 hours but for Carper Shell granule, 60% of ground calcined shell, 10% of thin soil, 20% of Maetan-soil, 10% of carbon dust and heated at 1100°c for 8 hours were used. The result can be summarized as follows.

1. The Carper Shell granule was more efficient in fluoride removal in term of capacity. The calculation from regression equation of the 30 cm. bed, 4.61 ppm of fluoride concentration sample and filtration rate at 10.3 gpm./ft<sup>2</sup> can predict that the Carper Shell has the lasting time 29.81 hours. ( $P < 0.0005$ )
2. The Carper Shell granule was statistical significant more efficient in fluoride removal at both concentrations, both bed heights and both flow rates, during ten hours tested peroid ( $P < 0.0005$ )
3. Both types of shell granules showed better efficiency at 30 cm. bed with both concentrations and both filtering rates when Paired-T-test was used. ( $P < 0.0005$ )
4. The analysis of filtration rate, also Paired-T-test was used, it was found that rate of filtration at 10.3 gpm/ft<sup>2</sup> was statistically significant more efficient that the higher rate at both concentrations and both bed sizes. ( $P < 0.0005$ )
5. With the same statistical test as 4 found that the efficiency in fluoride removal was better at lower concentration of tested samples at both bed sizes and flow rates than high concentration of tested samples ( $P < 0.0005$ ).

All experiments were satisfactory corresponded the hypothesis.