Thesis Title : Preparation and Evaluation of Free-Oxygen Absorber

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ABSTRACT

Oxidation of food and pharmaceutical products can be prevented by removing free oxygen. Ferrous compound was used as free oxygen absorber (FOA) in this study. It was prepared from the chemical reaction of ferrous sulfate and sodium hydroxide under nitrogen atmosphere. A damp mass of fine ferrous compound particle with about 20 microns geometric mean diameter and 35.03% moisture content was obtained. The product showed low oxygen absorbent activity due to limitation of available surface area. Adsorbents such as fumed silica and activated charcoal were used for the purpose of increasing surface area and flow property of ferrous compound. About 1 g of the free oxygen absorber was packed in an oxygen permeable bag (kraft paper/low density polyethyene, kraft paper / ethylene vinyl acetate and low-density polyethytlene bag) and then heat sealed to give a 40 mm x 50 mm pouch. The pouches were kept in oxygen barrier bags (kraft / polyester/polyethylene/aluminium foil/polyethylene or

nylon/polyvinylidene chloride/polyethylene).

The rate and extent of chemical reaction between FOA and free oxygen were studied at room temperature. When FOA was exposed to air, the reaction was fitted to "shrinking unreacted core" model and found to be diffusion controlled in case of FOA powder and chemical controlled in case of FOA in an oxygen permeable pouch.

The efficacy of FOA in removing free oxygen was tested by placing 4.4 g of FOA in a 500 ml air tight amber glass bottle. The content of free oxygen in air was monitored by an oxygen meter. The content of free oxygen was reduced by half after 8 hours of exposure at room temperature.