

## **ABSTRACT**

**INVESTIGATION OF RADIATION SENSITIVITY OF GALLIC ACID  
AND THEIR ESTERS VIA ELECTRON SPIN RESONANCE  
SPECTROSCOPY (ESR)  
MSC THESIS  
MEHMET OKTAY BAL  
BALIKESIR UNIVERSITY INSTITUTE OF SCIENCE  
PHYSICS  
(SUPERVISOR: ASSIST. PROF. DR. HASAN TUNER )**

**BALIKESİR, AUGUST 2013**

Gallates which are naturally occurring phenolic components have an antioxidant activity and they are widely used in food, pharmaceutical and cosmetic industries. Shelf life of many materials used in industry are prolonged and sterilized by purifying them from microorganism by irradiating them with high energy radiation. Although irradiation produces positive effects, it can also produce unexpected effects by making damages in their molecular and natural structure. For this purpose, it is important to determine the affect of the radiosterilization on the irradiated samples. The radiation sensitivity of Gallic Acid (GA), Gallic Acid Monohydrate (GAm) and Propyl Gallate (PG) is determined in the present thesis. Therefore, Electron Spin Resonance (ESR) spectroscopy, which is commonly used to investigate species having unpaired electron, was used to determine the radiation sensitivity of interested samples. ESR signal intensities measured using samples irradiated at room temperature to different doses were using to construct the dose-response curves. Changes in signal intensities at room temperature with microwave power were used to evaluate the saturation features. The kinetic features of radiation induced radical species were determined by annealing at high temperatures and by signal intensity changes above room temperatures. Spectrum simulation studies were performed to determine the spectroscopic features of free radicals which contribute to the ESR spectrum.

From performed evaluations it was concluded that investigated samples obey the following order from radiation sensitivity point of view: PG > GAm > GA.

**KEYWORDS:** Electron Spin Resonance (ESR), Gallic Acid (GA), Gallic Acid Monohydrate (GAm), Propyl Gallate (PG), Radiaosterilization, Radiation dose, Radical.