

INVESTIGATION OF THE EFFECT OF MICROWAVE IRRADIATION ON ACACIA POWDER

R.M.E. Richards and R. Al Shawa, Department of Pharmaceutics, University of Strathclyde, Glasgow, Scotland.

The natural origin, collection and storage of gum acacia means that preparations containing it are likely to be microbially contaminated. This investigation was to determine the contamination of various samples of acacia and the effect of microwave irradiation on the bacterial contamination, enzyme activity and glycoside stability of acacia powder and on the viscosity of solutions prepared from the powder so treated.

Acacia powder was prepared from four samples of acacia tears of known origins and together with a commercial sample of acacia powder BP was compared for the level and type of bacterial contamination using the pour plate counting method. Acacia powder BP was the most contaminated sample and was used in subsequent investigations of the effect of microwave treatment. The Ferranti-Shirley viscometer was used to assess the relative viscosity of acacia solutions prepared with acacia after various treatments. The microwave source was a Belling microwave oven which was rated to deliver 700 watt (high power) at a wavelength of 2450 MHz. A microwave oven thermometer type TH77 was used to estimate oven temperatures.

2g samples powdered acacia were individually and aseptically placed on sterile platforms of Whatman filter paper No. 54 of fixed dimensions and placed at the centre of the oven turntable for treatment. 25 ml. water in a suitable container was placed in the oven during irradiation. Separate samples of powder were irradiated for 5,10,15,20,25,30,35 and 40 min. respectively and immediately after treatment were aseptically dissolved in sterile water to give 10% w/v solutions which were evaluated for bacterial count, enzyme activity, glycoside stability and viscosity. Non irradiated acacia powder was similarly evaluated.

Gum acacia oxidases and peroxidases produce a lavender colour with 1% α naphthol in 50% ethanol. Enzyme activity was noticeably reduced after 10 min. irradiation and completely inactivated after 20-25 min. No colour change in Fehling's solution was produced by acacia after any treatment time indicating a lack of glycoside breakdown in the acacia. Untreated acacia powder had an approximate count of 1.6×10^3 organisms g^{-1} but samples irradiated for 10 min. and longer had reducing bacterial counts until at 40 min. no organisms were present. There was either little or no effect on the apparent viscosity of acacia solutions prepared with powder irradiated for up to 30 min. but samples irradiated for 35 and 40 min. showed a slight increase in apparent viscosity.

Under the conditions of this investigation microwave irradiation in a commercial microwave oven effectively inactivated the natural contamination in a sample of acacia powder BP without seriously affecting the assessed rheological properties of the acacia. Considerable care must be taken, however, to prevent excess heat effects during irradiation.