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# Treating Cataracts by Removing the Protein Mass Accumulated on the Eye Lens with Zinc Magnesium Oxide

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## Abstract

**Background:** People have been struggling with water pearl disease for several decades. In recent years, several treatment methods have been introduced, including surgery, which is an invasive method. The accumulation of proteins and clouding of the lens are the greatest challenges associated with this disease.

**Objectives:** To achieve successful synthesis of zinc magnesium oxide and successful drug testing of protein masses.

**Materials and methods:** The goal of the present study was to experimentally destroy the protein mass. In this article, the effectiveness of zinc magnesium oxide in removing protein masses was investigated. Zinc magnesium oxide was synthesized by two normal and green methods using mustard oil.

**Results:** The crystallization quality of the main nongreen sample was investigated via X-ray diffraction, and the secondary compounds were identified. An FTIR molecular bonding test was also performed on the sample, which confirmed that the correct molecular bonds were established. The effect of the suspension obtained from the synthesis of green zinc magnesium oxide and normal zinc magnesium oxide on egg protein was investigated. The results showed that the egg protein was dissolved in the green sample.

**Conclusion:** Examining suspensions resulting from the synthesis of green and normal magnesium-zinc oxide nanoparticles on egg white protein showed that egg white protein was dissolved in the green sample but not in the nongreen sample; this difference may be fundamental for determining the presence of mustard oil.

**Keywords:** Cataract, Suspension, Zinc Oxide and Mustard Oil.

## 1. Introduction

A lens is a piece of transparent material that is made in such a way that light rays bend in a certain way when passing through it. This bending can mean that rays converge at a certain point from a certain point [1]. Glass or plastic used to make the lens, and the shape of the lens determines whether light rays converge or diverge. Cataract is a progressive eye disorder that causes lenses inside the eye to become cloudy [2], which blocks the path of light from entering the eye, and the affected person suffers from blurred vision and impaired vision. This complication is painless, and if not treated, it can cause blindness [2].

Cataracts are the main cause of blindness worldwide. Cataracts account for approximately 42% of all cases of blindness. Usually, cataracts develop slowly. You may not know you have this disease until you touch the opposite eye: blurred vision, sensitivity to light, white pupils, difficulty seeing at night, reduced vision and glare from streetlights; driving is dangerous for people with cataracts. [4, 3]. Drivers with cataracts experience blurred vision and eye wiping. When individuals can develop cataracts, the greatest factor is age. More than 40% of people in the United States aged 75 years or older suffer from lens clouding [5-7]. most likely, when damage to the tissue of the lens occurs, cataract. There are several causes of this disease [8-11].

Age, family history, diabetes, UV rays, smoking. However, there are no proven methods available for preventing cataracts [12]. Cataract treatment can be performed via different methods. Although there is only one definitive treatment method for cataracts, surgery is usually performed on an outpatient basis with local anaesthesia [12]. usually requires 10 or 15 minutes. Surgery is a definitive and effective method for treating cataracts; however, it also carries the risk of infection and bleeding. Recovery usually occurs within 8 days [13]. Although some people with cataracts can improve their vision with glasses, lenses or increasing ambient light to some extent, the only effective treatment for people with cataracts is surgery. [13].

The lens of the eye is a transparent structure that focuses images on the light-sensitive retina. Cataracts cause certain proteins to form in the lens. These proteins gradually

become larger and impair vision. They distort or block the passage of light through the lens (Figure 1) [14].

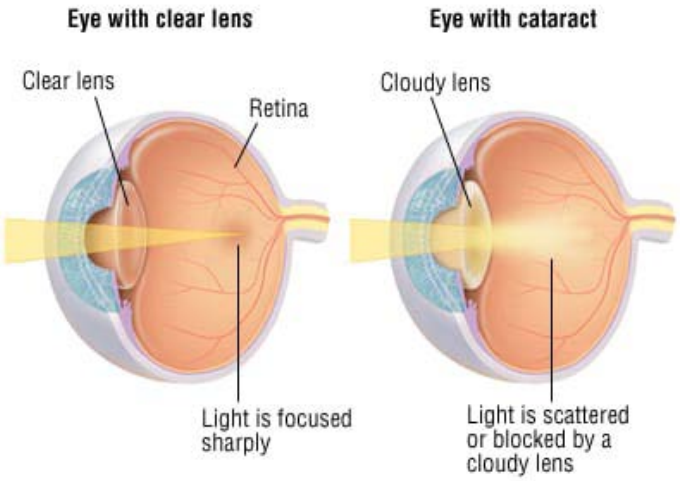


**Figure 1:** How Light Enters the Eye After the Lens Becomes Cloudy [14].

The purpose of this article was to eliminate protein masses (cloudy lenses) accumulated on eye lenses due to cataracts.

## 2. Method

Materials: Magnesium sulfate was obtained from Iran Hamana Company, zinc oxide nanoparticles were obtained from Germany Merck, and sodium hydroxide and mustard seed oils were used.

Method: Zinc oxide (0.8 g) was dissolved in 100 ml of distilled water, 1.2 g of magnesium sulfate was dissolved in 100 ml of distilled water, and 0.4 g of sodium hydroxide was dissolved in 100 ml of distilled water. The mixture was subsequently combined and placed on a stirrer for 12 hours at room temperature (Figure 2).

$2ZnO+2\ mgSo4+2NaOH \rightarrow ZnMgo+2NaSo4+2H2O$

Then, we reduced 60 ml of magnesium oxide solution with 40 ml of mustard seed oil and incubated it on a stirrer at 80°C for 3 hours (Figure 3).

**Figure 2:** Green Synthesis of Zinc Magnesium Oxide.

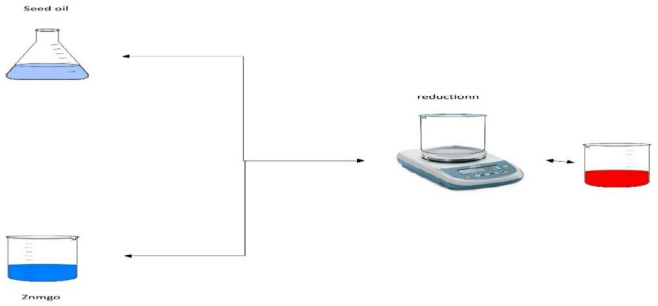


**Figure 3:** Green Synthesis Diagram of Zinc Magnesium Oxide.

## 3. Results

### FTIR

FTIR spectroscopy is a method for determining the structure of molecules. By using this method, it is possible to determine the presence or change of chemical in a substance. With this method, it is possible to understand the structure of the molecules, functional groups and bonds in the sample. In the FTIR spectroscopy method, an infrared (IR) beam passes through the sample. Part of it is absorbed by the sample, and the other part passes through the sample. The molecular structure of these materials is also unique. The horizontal graph in the FTIR analysis corresponds to the wavelength of the functional group, and the vertical graph corresponds to the absorption intensity of the functional groups. The synthesized zinc oxide-polyethylene glycol sample doped with iodine was subjected to FTIR analysis, and the results are shown in Figure 4.

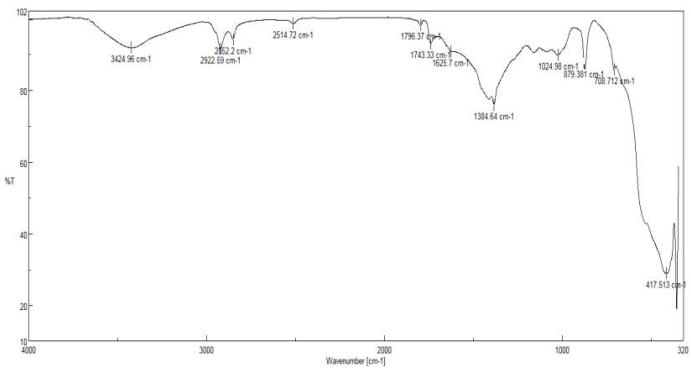


**Figure 4:** FTIR Spectrum of Magnesium Zinc Oxide.

Figure 4 shows the FTIR analysis of the ZnMgO sample. In this figure, the peak at 3424 $cm^{-1}$ is an OH point. The peak at 1625 $cm^{-1}$ is related to the C-O bond. The peak at 1384 cm-1 represents amide groups. The peak at 417 $cm^{-1}$ corresponds to ZnO.

### XRD

The synthesized samples were subjected to X-ray diffraction to measure the degree of crystallization of the material. X-ray diffraction was performed with a wavelength of 1.5406 angstroms by a copper lamp. Figure 5 shows the XRD pattern of the zinc oxide sample of synthesized magnesium oxide. All the diffraction peaks appear in this pattern, and these peaks are long and narrow, which indicates a high degree of crystallization of the material. However, there are several peaks

at 32, 34, 36, and 48 points. Zinc oxide and magnesium compounds were well identified in this analysis.

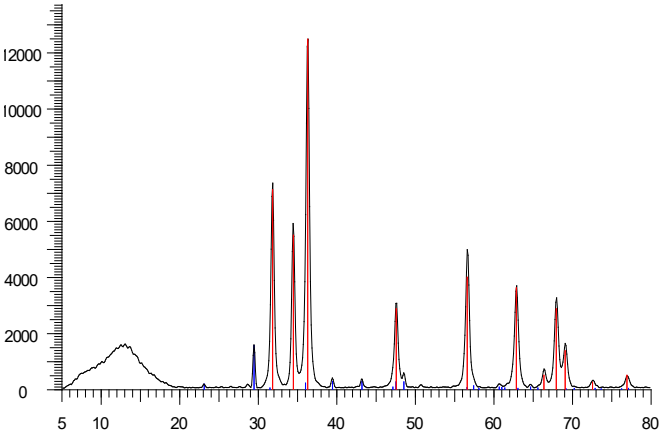


**Figure 5:** XRD Pattern of Magnesium Zinc Oxide.

## Protein mass test

We used protein mass. To test the drug efficacy, we obtained drug from egg whites. We put one gram of egg whites in two test tubes and then put 20 ml of nongreen magnesium oxide in one of the test tubes and the same amount of green magnesium in the other. After two days, we observed that the green sample dissolved little white, but the nongreen sample did not change. After four days, the green sample completely dissolved the little white, but the nongreen sample was still unchanged (Figure 6).


**Figure 6:** Solution of Magnesium Zinc Oxide in Egg Whites.

## 4. Discussion

cataracts have been the leading cause of preventable blindness worldwide, but pharmacological strategies to mitigate, prevent, or cure this blinding disease have remained elusive. With the projected increase in life expectancy, the number of people affected with cataracts is predicted to increase worldwide. Therefore, identifying a noninvasive treatment for this disease is important. In past and recent studies, the antioxidant activity of plants has been considered for the treatment of this disease. To date, compounds that possess antioxidant and free radical scavenging activities have shown tremendous potential in these experimental studies. Therefore, further research is necessary to establish the efficacy and safety profile of these herbal remedies and antioxidants, standardize drug formulations, and conduct double-blinded studies to validate their clinical application in humans. Interestingly, the age-related eye disease study 2 (AREDS2) failed to demonstrate a significant deterioration in the progression of age-related cataracts following lutein/zeaxanthine supplementation [15]. It seems that the antioxidant properties of mustard caused these differences in the two green and nongreen samples in this study.

## 5. Conclusion

In this article, the effectiveness of magnesium-zinc oxide for removing protein masses was investigated. The synthesis of magnesium-zinc oxide was performed by two normal and green methods (using mustard oil). The quality of crystallization of the main nongreen sample was investigated by X-ray diffraction. The long and narrow peaks indicate a good degree of crystallization of the synthesized material. Additionally, FTIR molecular bonding tests showed the establishment of correct molecular bonds. An examination of the suspension resulting from the synthesis of green and normal magnesium-zinc oxide nanoparticles on egg white protein showed that the egg white protein was dissolved in the green sample and that the nongreen sample was not generated well; this may be the fundamental difference in the presence of mustard oil.

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