

Efficacy of ozonation on micro-organisms disinfection in well water treatment

M. N. Norhayati¹, S. L. Yap^{1*}, C. S. J. Teh² and K. L. Thong³

¹Plasma Technology Research Centre, Physics Department, University of Malaya, 50603 Kuala Lumpur, Malaysia

²Department of Medical Microbiology, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia

³Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia

(*Corresponding author e-mail: yapsl@um.edu.my)

Received 11-06-2013; accepted 19-7-2013

Abstract Chlorination disinfection by-products in drinking water have often been associated with the occurrence of bladder cancer and rectal cancer. Ozonation is one of the safe alternatives for water treatment. In this study, ozone for ozonation was produced based on Dielectric Barrier Discharge (DBD) and the efficacy of ozone on complete disinfection of microorganisms in well water was investigated at laboratory scale. The efficacy of ozonation was also compared with chlorination on well water disinfection. Well water in Bachok was chosen in this study because chlorination is still widely used by the residents in the district as a means of disinfection of the well water for daily consumption. The data showed that the complete inactivation of microorganisms in well water was achieved after 120 seconds of ozonation, same as the time required by chlorination.

Keywords dielectric barrier discharge – water treatment – ozonation – chlorination

INTRODUCTION

The quality of water for drinking and other household consumption is an important aspect of domestic water supplies, which influences hygiene and therefore public health. The use of chlorine is the most common method in microbial disinfection in water for drinking purposes [1]. Even though chlorination is commonly practiced, it yields harmful by-products such as chloroform, bromate, chlorite, haloacetic acids (HAA5), and total trihalomethanes (THMs) [2]. The studies of disinfection by-product (DBPs) have started in the early 1970s whereby THMs and HAA5 were first detected in chlorinated drinking water. The public is concerned about the health effects of DBPs.

There were few studies that reported the association of chlorinated water with occurrence of cancers. A study by Will et al. [3] in 2000 investigated the relationship between chlorination by-products in public water supplies
