Chapter 1:
Introduction

INTRODUCTION

1.1 General Outline

Egypt has been facing increasing problems due to the pollution of its surface and groundwater. Major water bodies in Egypt are receiving increasing loads of domestic, industrial, and agricultural pollution loads due to the inadequate and insufficient treatment facilities. This deterioration in Egypt's water quality threats the beneficial uses of water for domestic, agriculture, and industrial purposes. In addition to the main pollutants such as oxygen demanding substances, and pathogens; micro pollutants, heavy metals, and pesticides are increasingly detected in the River Nile, irrigation canals, agriculture drains, coastal lakes, and ground water aquifers. If the current trend of deterioration of water quality is not identified, the pressure of the limited water resources on Egypt's development will be highly constraining [1].

The distribution of certain chemical components in surface water may provide useful information about the suitability of water quality for drinking, growth of fish and irrigation [2].

The main objective of the present thesis is to study the chemical pollutants in surface water in Qalubia Governorate, and to suggest a chemical treatment method for reducing some of these pollutants. The term "water pollution" is referred to the addition to water of an excess of material that is harmful to human, animals, or desirable aquatic life. Water pollution is very impact, which changes the quality of our surface and groundwater to such a degree that its suitability either for human

consumption or for support of man's natural life processes will decrease or cease [3,4].

1.2 Problem Definition

The main sources of water pollution in the area under consideration are mainly originated from agriculture, domestic installations and from industrial wastes. These wastes, or effluents, is made up of complex mixture, containing thouthand of chemicals, most of which have yet to be chemically and toxicologically characterised. There is an urgent need to screen these wastewater, using sensitive, and rapid tests, to try and assess potential hazards to aquatic life [5].

The major industrial area, which impacts the quality of water in Qalubia Governorate, is Shoubra El Kheima. It represents one of the highest concentrations of industry in Egypt [6,7]. The industrial activities include metal production, food processing, detergent and soap manufacturing, textile finishing and paper production. Qalubia drain receives the wastewater from Shoubra El Kheima and others small town like Kalyob, Tokh, Shebeen El Kanater and Benha.

1.3 Nature And Types Of Water Pollutants

Water pollutants can be classified under the following criteria:

1.3.1 Nutrients

Nutrients are chemicals, which may be present in water naturally, or are added by human activity. Nutrients are essential to the metabolism

and growth of aquatic organisms. The most dominated aquatic plant nutrient elements are nitrogen and phosphorus [8].

Various forms of nitrogen exist in the environment including ammonia, nitrite, nitrate, organic nitrogen, and nitrogen gases. The ammonia ion either is released from proteinaceous organic matter and urea during the nitrification process where bacteria break down complex proteins into ammonia, nitrite, and nitrate, or is synthesized in industrial processes. The nitrite ion is also formed from the oxidation of the ammonia ions or the reduction of nitrate by certain microorganisms found in soil, water, sewage, and the digestive tract. The nitrate ion is formed by the complete oxidation of ammonia ions by soil or water microorganisms [9,10].

Phosphorus as phosphate is one of the major nutrients required for the nutrition and is essential for life. Excessive phosphate concentrations would stimulate plant growth. Phosphates enter water bodies from several different sources. The human body discharges about 0.4 kg of phosphorus per year. The use of phosphate detergents and other domestic phosphate increase the per capita contribution to about 1.5 kg/year. Industries also contribute large amounts of phosphates. Agricultural drainage water, cattle feedlots, tree leaves, and atmospheric deposition are all contributing varying amounts of phosphates [11-13].

1.3.2 Trace metals

Trace metals, including copper, cadmium and numerous others metals, occur in solution in natural waters. They appear in relatively