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# Applications of Egg Shell and Egg Shell Membrane as Adsorbents: A Review

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## Abstract

Worldwide consumption of hen eggs is quite high, which results into availability of large amount of discarded egg wastes, particularly egg shell (ES) and egg shell membrane (ESM). Disposal of ES and ESM is always a problem particularly to the authorities of food, bakery and poultry units. In recent years, attempts have been made to utilize ES and ESM for the production of biodiesel and collagen but results are not much economically viable.

In the hunt of waste materials as potential scavenger of hazardous chemicals, ES and ESM have emerged as non-toxic, versatile and efficient adsorbents. Last 10 years have witnessed a systematic growth in the use of ES and ESM as adsorbents for the removal of variety of organic as well as inorganic hazardous chemicals, particularly from wastewater. Literature survey reveals that ES and ESM in their natural as well as chemically modified forms have provided excellent results for the removal of various classes of dyes, oxalic acid, phenol, pesticides, humic acid, pharmaceuticals, surfactants, PAHs, heavy-, precious- and light- metals, actinides, fluorides, etc. In recent years powdered ESM have been modified to nano-particles and used as adsorbent in various interesting applications. Reports are also available on the use of nanostructured material CHAP, derived from ES, for the removal of cadmium and lead ions from waste water.

Present review article is an attempt to summarize the research carried out on the above mentioned applications of ES and ESM. Overall 108 research articles have been included in this review, which describe a methodical growth in the subject matter.

**Key Words:** Egg shell; Egg shell membrane; bio-waste material; adsorption; adsorbent

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