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STUDY ON THE AGEING EFFECT OF COATED AND UNCOATED POLYETHLENE SHEET USED FOR DAMP PROOF CONCRETE

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A study on the ageing effect of coated and uncoated polyethylene sheet used in damp proof concrete was carried. The chemical and physical changes were studied by I/R technique and flexibility measurements. In uncoated polyethylene carbonyl absorption emerged at λ max 1760 in after a year which increased with time and the flexibility of decreased considerably, whereas such a phenomenon was not observed in coated polyethylene.

INTRODUCTION

The degradation of polymers due to temperature [15], oxygen and ultraviolet light [5,6] is a common phenomenon in polymers. Different types of coatings [12], stabilizers [7], antioxidants [9,10], and UV stabilizers [11] are used to prevent the process of degradation in polymers. Different techniques have been previously used to decrease the effect of degradation of polyethylene [8, 12]. Once the degradation has started, it is not possible to stop this reaction. Due to autocatalytic nature of the reaction, the rate of oxidation increases as the amount of oxygen absorbed increases. It has also been reported that some microorganisms [4] also play part in thhe degradation of the polymer. It has also been observed that climatic temperature also plays a predominent role in the degradation [15] of polyethylene. The oxidation rate increases with increase in atmospheric temperature.

APPARATUS AND PROCEDURE

1. An uncoated specially made polyethylene sheet for damp-proof concrete was procured from the market.
2. Polyethylene (coated). The market sample of polythene was coated with bituman compounds and then used for study.
3. Bituman compound. Bituman compound was prepared with bitumen, solvent, filler, plasticiser. All these components were taken from the market (commercial grade).

PROCEDURE

The sample of polyethylene taken from the market was characterized by I/R technique before utilization. Then the sample were used for dampproof concrete. On another sample bituman A composition was applied and then utilized for damp proof concrete. Samples of coated and uncoated polyethylene were taken out of the concrete after one, two, three, and four years. The samples were then characterised by I/R technique and by measuring the flexibility of the sample.

RESULTS

1. It has been observed that the carbonyl peak appeared in the uncoated polyethylene at λ max 1760. This absorption band increased with time (Fig. 1, 2). But the coated polyethylene sample did not show any change in the I/R spectrum.
2. The coated polyethylene sample did not show any decrease in flexibility while the uncoated polyethelene became brittle.

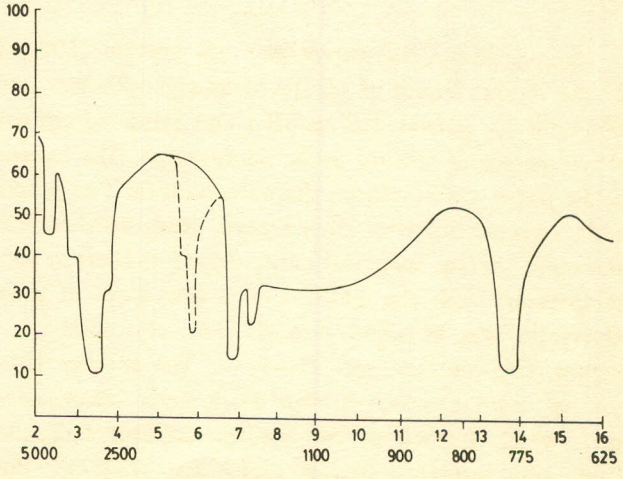

Fig. 1. IR spectrum of commercial polyethylene sheet . . . . . carbonyl peak emerged after ageing.

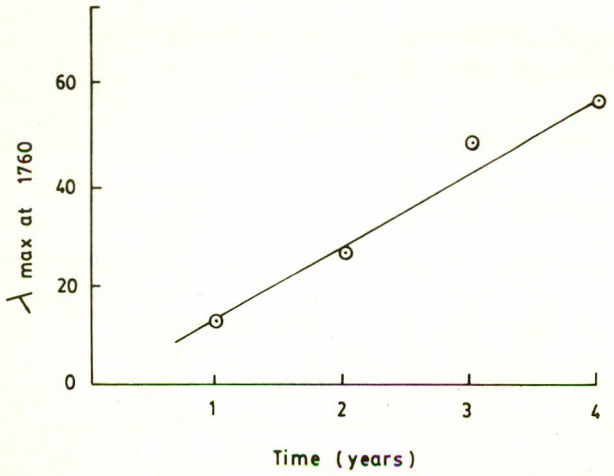

Fig. 2. Magnitude of the absorption at λ max 1760 plotted against time (years).

DISCUSSION

The above results clearly indicate that the utilization of uncoated polyethylene in damp proof concrete is of no use. The oxidation reaction takes place with the formation of a carbonyl bond. Due to this reaction the flexibility decreased considerably and cracking appeared in the polyethylene sheet. On the other hand in coated polyethylene, the oxidation reaction did not occur because the surface was coated with such material which hinders the oxidation reaction in polyethylene. The folding endurance was found to decrease rapidly as the brittlness increased with ageing in polyethylene. It is, therefore, suggested in the light of these observations that uncoated polyethylene should not be used for damp proof concrete which is a common practice in Pakistan today.

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