

CHAPTER 5 – CONCLUSIONS

Aluminium 2,4-pentanedione has little effect on the thermo-oxidative stability but shows considerable photodegradation activity in polyethylene and polypropylene films under accelerated weathering conditions. Poly (1,2-dihydro-2,2,4-trimethylquinoline) is an effective antioxidant yet accelerates photodegradation behaviour. Thus these compounds are expected to aid rapid degradation under the action of solar radiation without significantly affecting the recyclability of these polymers. They therefore have potential for controlling the mineralisation of plastic shopping bag litter.

The transition metal complexes and, in particular ferric stearate and titanil 2,4-pentanedione, were very effective prodegradants. Main chain scission is the main degradation reaction that occurs when polyethylene containing ferric stearate is degraded in natural weathering conditions. Copper stearate provided a measure of UV protection to polyethylene but not to polypropylene. The protection activity of the copper stearate is attributed to UV absorption.

Two additives: nickel dimethyl glyoxime and STETA were found to be effective light stabilizers for polyethylene and polypropylene films. However, they were not as good as Chimisorb 944. Nickel dimethyl glyoxime displayed slightly improved performance when used together with Anox 20. Its UV protection mechanism is attributed to a quenching action.

It has been observed that only some of the synthesised UV stabilisers were effective in LDPE and PP films. It would be interesting to determine whether they might perform better in other polymers.