# CHAPTER V
# CONCLUSIONS

## 5. Conclusion

Preparation of thermoplastic elastomers (TPEs) from shoe sole scrap and low density polyethylene (LDPE) was studied. The mechanical properties of thermoplastic elastomers were investigated as a function of the ratio of the shoe sole scrap/LDPE, microwave energy, and TMT as reclaiming agent. From this study, the following conclusions can be drawn from the experimental results:

1. Microwave energy can be used to devulcanized shoe sole scrap (SSS) and the devulcanized SSS can then be reprocessed and mixed with LDPE to prepare TPEs. The degee of devulcanize shoe sole scrap was presented by the gel fraction. The optimum condition to devulcanized shoe sole scrap with microwave energy was 360 watt for 60 sec because at this condition the shoe sole scrap with lowest gel fraction as well as without degradation or burning was obtain.
2. The results of this investigatation have revealed a definite influence of devulcanized shoe sole scrap on mechanical properties of thermoplastic elastomers.
3. Increasing LDPE content can improve the mechanical properties (i.e., tensile properties and tear strength) and physical properties (i.e., hardness) of TPEs. Tensile properties, hardness, and tear strength increased with increasing LDPE content. This result was expected because as more LDPE content was incorporated into the rubber matrix, the plasticity of the rubber chain was increased, resulting in more toughness of TPEs.
4. Microwave energy can reduce the mechanical properties of TPEs. This may be because plasticity of SSS increased when the degree of crosslinking decreased resulting in lower extensibility. In addition, the SSS particles in TPEs had poor interfacial adhesion with the LDPE phase because SSS was degraded by microwave energy.
5. The tensile strength and 50%modulus of SSS/LDPE TPEs filled TMTD as a reclaiming agent were higher than those of unfilled TMTD-SSS/LDPE TPEs due to crosslinking reaction occurring during process when TMTD was added as a

reclaiming agent into SSS. The elongation at break of SSS/LDPE TPEs filled TMTD was lower than those of unfilled TMTD SSS/LDPE TPEs because TMTD broke polymer chain of SSS into the shorter ones resulting reduction of the elasticity of SSS. In contrast, the addition of TMTD helped promoting the elongation at break values of M-SSS/LDPE TPEs. Obviously, M-SSS/LDPE TPEs filled TMTD had higher elongation at break than the unfilled TMTD ones.