

## CHAPTER V

### CONCLUSION AND SUGGESTIONS

#### 5.1 Conclusion

This study reveals that ground rubber tire (GRT) and reclaimed tire rubber (RTR) can be used as toughening agent for PVC. RTR is much better than GRT for improving the toughness of PVC, since RTR is a devulcanized tire-rubber waste, in which the carbon-sulfur bonds that crosslink between the rubber chains have already been ruptured. Therefore the rubber chains of RTR can penetrate in to PVC matrix much more than GRT goes, leading to better adhesion and higher impact strength. Moreover, this study also shows that surface modification of RTR and GRT by chlorination with trichloroisocyanuric acid (TCICA) can be used to improve the physical properties of blend PVC.

For finding the other strategy for improvement of the impact strength in this study, the terpolymer like chlorosulfonated polyethylene (CSPE) and nitrile butadiene rubber (NBR) were used for this purpose. The optimum recipes for all PVC blends are listed in Table 5.1.

**Table 5.1** The physical properties of the composite PVC prepared at the optimum recipe.

Sample	Terpolymer	Physical properties			
		Tensile Strength (MPa)	Elongation (%)	Hardness (Shore D)	Impact strength (J/cm)
R- PVC	-	58.6±1.8	13.3±2.9	78.1±2.1	2.3±0.2
R-PVC/ Cl-RTR (40 phr)	-	18.5±2.1	8.5±0.6	65.3±1.6	3.8±0.4
	CSPE, 30phr	18.3±1.7	31.1±1.3	61.6±1.6	7.5±0.7
	NBR, 30phr	25.7±1.5	11.3±1.7	59.4±1.8	5.0±0.7
R-PVC/ Cl-GRT (50 phr)	-	15.0±0.8	8.8±0.4	69.3±1.8	3.7±0.7
	CSPE, 30phr	17.8±2.4	30.0±2.9	65.0±1.3	5.1±0.7
	NBR, 30phr	17.9±4.1	20.9±3.4	63.7±1.8	8.0±0.5

From **Table 5.1**, it can be concluded that the compatibilizer can enhance not only impact strength of both CI-RTR and CI-GRT system but also the flexibility indicated by the %elongation. In addition, it shows that a proper compatibilization depend on the composition. In this study, CSPE is effective for R-PVC/CI-RTR whereas NBR is effective for R-PVC/CI-GRT. The ingredient for R-PVC/CI-RTR/CSPE is 100/40/30, and for R-PVC/CI-GRT/NBR is 100/50/30.

## 5.2 Suggestions for the further work

From this study, the physical properties of PVC blended with modified and unmodified tire rubber wastes could not be dramatically enhanced. The compatibilizers are applied for reaching the aim. The suggestions for the further work are.

1. To obtain a higher homogeneity of blended product, a high speed mixer is strongly recommended to replace the two-roll mill mixer.
2. Chlorination method on the rubber particles should be modified in order to obtain rubber with higher chloride contents.