CHAPTER 5

CONCLUSION

PVC and nitrile rubber were compounded individually before blending. PVC was compounded in a turbo-mixer by dry blending with its ingredients, subsequently it was processed by a two-rolls mill. Nitrile rubber was compounded in an internal mixer (Brabender Plasticorder) with other ingredients, mixed with BHT and vulcanization system for vulcanized rubber compounds. The vulcanization systems can be divided into two recipes; the first recipe (Recipe1) has zinc active, stearic acid, TMTM and sulfur. The second recipe (Recipe2) has zinc active, stearic acid, TMTM, MBTS, CBS and sulfur. In this study, the precrosslinking nitrile powder (P83) was also studied for comparison with conventional rubber.

Effects of fillers on physical properties of PVC/NBR blends were studied. Calcium carbonate($CaCO_3$), carbon black and silica fillers were used as fillers. The PVC/NBR blends were mixed with 45 parts of fillers in 100 parts of polymer blends. After mixing, the samples were compressed and cut into the specific shape as test specimens. The properties measured were hardness, modulus at 100 % and 300 % elongation, tensile strength, elongation at break, tear strength, oil resistance and abrasion resistance. The results are summarized as follows:

1) For unfilled compounds, the hardness and modulus at 100 and 300 % elongation increase with increasing PVC content. For PVC blended with nitrile rubber powder or vulcanized rubber, these properties are improved when compared with unvulcanized rubbers.

2) For filled compounds, the hardness, modulus at 100, 300 % elongation, tensile strength and tear strength of carbon black filled compounds are higher than that of $CaCO_3$ and silica filled compounds but the elongation at break is lower.

3) For unfilled PVC/NBR blends, oil resistant property was improved because of PVC content. For filled PVC/NBR blends, the silica filled compounds had the highest oil resistant properties.

4) For abrasion resistance, vulcanized rubber can improve abrasion resistance of PVC/NBR blends compared with unvulcanized rubbers. For filled compounds, the abrasion resistance of carbon black filled compounds is higher than that of silica and $CaCO_3$ filled compounds.

5) From microscopic studies of fracture surface of filled compounded specimen, it showed the brittle fracture for polymer blends with high PVC contents and the ductile fracture for polymer blends with high rubber contents.

6) The PVC/NBR blends showed two glass transition temperatures (80 ± 10 °C for PVC, -20 ± 10 °C for NBR). The glass transition temperature of PVC was presented more clearly than that of NBR.

In the field of polymer blends, it should be studied further in the following aspects:

1. Modify these polymer blends by adding other kinds of vulcanization system (no sulfur system).

2. Study rheological behavior of these polymer blends in order to improve the processing.

3. Effect of mixing steps on physical properties.

4. Effect of the third kind of polymer in the PVC/NBR blends

5. Study the properties of reuse or recycling of PVC/NBR blends.