CHAPTER I
INTRODUCTION

Due to the car production around the world is increasing, the production of rubber parts become a big market because they have highly consumed in fuel and chemical transmission line in automotive and chemical industries such as gasket, suspension bush, hose air, rubber radiator hose, hose breather, oil tank plug, drain pipe, engine mounting, weather strips door sponge. The rubbers for special applications have prominent properties such as flexibility, thermal resistance, chemical and oil resistance, compressibility, impact resistance, and friction resistance. As a result of the special desire properties, the synthetic rubbers play a big role as major raw materials because it is easy to be compounded to reach the required properties. Thailand is the largest producer of natural rubber and exports natural rubber to all over the world, whereas the synthetic rubbers are imported in great quantity. So the production cost of automotive rubber part is increasing.

Dynamic vulcanization is the process of vulcanization of an elastomer during its melt mixing with a thermoplastic, which results to a new class of materials called thermoplastic vulcanizates (TPV). The initial stage of vulcanization show co-continuous morphology, then apply any torque or shear rate, rubber phase are going to be separated gradually until the final stage which exist the fine dispersed morphology.

Nowadays acrylonitrile butadiene rubber (NBR) uses as commercial synthetic rubber in automotive industries and usually imported in a large quantity. Moreover, fluoroelastomer (FKM) is well known for the excellent thermal, oil and chemical resistances but the price of FKM is still high therefore the dynamically vulcanized blends of epoxidized natural rubber (ENR) and poly(vinylidene fluoride) (PVDF) have been recognized as TPV materials which are promising candidates and NBR acts as benchmark in this research to compare results from ENR blends.

Supri and H. Ismail (2006) reported that dynamically vulcanized blends of PVC/NBR gave better results than binary blends in terms of mechanical properties, swelling resistance, thermal stability and interaction between PVC and NBR. The results of Yamoun C. (2011) suggest that DBPH peroxide system works better as a

curing agent for dynamic vulcanization of natural rubber/fluoroelastomer/HDPE than DCP sulfur system on mechanical properties, degree of cross-linking, compatibility and morphology. Furthermore, Phothiphon K. (2010) was found that increasing DBPH content in natural rubber/PVDF/PHBV blends via dynamic vulcanization result to better tensile and tear strength and oil swelling resistance.

Nowadays, people have a big concern about the global warming and there are many environmental friendly products to save the world or reduce the chance to destroy the environment. Polylactic acid (PLA) is the most popular environmental-friendly plastics and being able to hydrolyzed easily by thermal. Due to the high viscosity of PVDF, adding PLA is promising substance to improve the flow of PVDF during the process. Thus making the blends of ENR and PVDF materials could be promising candidates to be used as excellent oil and chemical resistance materials.

In this study, PVDF and PLA used as thermoplastic part to provide oil and chemical resistant properties and make it more environmental friendly, respectively. ENR used as rubber part to provide the elastomeric properties. This research report the effects of dynamic vulcanization, contents of ENR, PVDF, curing agent and organoclay including the addition of PLA that affect on mechanical and thermal properties, morphology and oil swelling index of the blends.