CONTENTS

PREFACE

ABBREVIATIONS AND SYMBOLS

CHAPTER 1 INTRODUCTION

1. Reinforcement
1.1 Reinforcement of rubbers with particulate fillers
  1.1.1 Particle size/surface area
  1.1.2 Specific surface activity/chemical composition
  1.1.3 Structure and aggregation/porosity
1.2 Particulate fillers
  1.2.1 Carbon black
  1.2.2 Non-black fillers
  1.2.2.1 Silica
1.3 Filler surface activity
1.4 Filler surface modification
  1.4.1 Carbon black-surface modification and characterization
  1.4.2 Silica-surface modification and characterization
  1.4.2.1 Silanes as silica surface modifier
1.5 Rubber reinforcement
  1.5.1 Reinforcement mechanism
  1.5.2 Physical and chemical interactions at the filler surface
  1.5.3 State of the filler in the rubber mix
  1.5.4 State of rubber in the filled composite
  1.5.5 Rubber-filler interaction
  1.5.6 Effect of filler on processability of rubber compounds
  1.5.7 Effect of filler on cure behaviour and crosslink formation
  1.5.8 Effect of filler on vulcanize properties
    1.5.8.1 Failure properties
    1.5.8.2 Dynamic mechanical properties
    1.5.8.3 Swelling behaviour
1.6 Silica reinforcement of rubbers
  1.6.1 Silica as a filler in rubber-compounding aspects
  1.6.2 Silane modification in silica filled rubbers
  1.6.3 Silica reinforcement of non-polar rubbers
  1.6.4 Silica reinforcement of polar elastomers
1.7 Epoxidised natural rubber
  1.7.1 Preparation and properties
  1.7.2 Silica reinforcement of ENR
  1.7.3 Blending of ENR with other elastomers
CHAPTER 2 EXPERIMENTAL

2.1 Materials
   2.1.1 Rubbers
   2.1.2 Fillers
   2.1.3 Coupling agent
   2.1.4 Solvent
   2.1.5 Other chemicals

2.2 Processing
   2.2.1 Mastication/Blending
   2.2.2 Mixing of rubber compounds
   2.2.3 Mixing in Rheocord

2.3 Moulding and Testing
   2.3.1 Mooney viscosity
   2.3.2 Bound rubber
   2.3.3 Vulcanization
   2.3.4 Cure characteristics
   2.3.5 Physical testing

References

CHAPTER 3 ENR AS A REINFORCEMENT MODIFIER FOR SILICA FILLED NATURAL RUBBER

3.1 Introduction

3.2 Experimental
   3.2.1 Materials
   3.2.2 Mixing of rubber compounds
   3.2.3 Testing

3.3 Results and Discussion
   3.3.1 ENR50 as reinforcement modifier – effect on cure characteristics and vulcanizate properties
   3.3.2 Effects of varying epoxy concentration on compound and vulcanizate properties

3.4 Conclusions

References
CHAPTER 9 SUMMARY AND CONCLUSIONS

9.1 Introduction  
9.2 ENR as a reinforcement modifier in rubbers  
9.3 ENR as a reinforcement modifier in silica filled natural rubber  
9.4 Dynamic mechanical properties of silica filled NR modified with ENR  
9.5 Mixing, bound rubber and rheological characterization of NR-Silica composites  
9.6 Effect of filler loading on peroxide vulcanization of silica filled NR  
9.7 Reinforcement characterization of sulphur vulcanized silica filled NR- Role of modifiers  
9.8 ENR as a reinforcement modifier for silica filled nitrile rubber  
9.9 Scope for future work  
9.10 Conclusions