CHAPTER V

CONCLUSIONS

Surface modification of precipitated silica was studied with different level of co-monomer charge (weight % polymer on the silica) by using a four-step thin film formation technique. Characterization of the surface modified-precipitated silicas showed that the modification of the silica surface induces hydrophobicity in the silica, reduces nitrogen BET surface area, and increases mean agglomerate particle size.

The compound physical studies showed that the amount of copolymer loading on the silica can significantly affect rubber compound reinforcing properties. The silica modified by a 20 gram charge of styrene/isoprene co-monomer per kg silica in the reactor afforded the most promising candidate based on evaluation in a silica-filled model rubber compound. This modified silica gave the maximum in rubber reinforcing properties for many tests, including tensile strength, modulus, tear strength and resilience. This modification also gave the minimum in compound cure time, abrasion loss and compression set.

The investigation of the effect of percent silica loading on compound physical properties shows that performance increases up to a loading of 40 PHR, beyond which the properties begin to deteriorate as the rubber becomes diluted. Both studies showed that filler/reinforcer surface modification by admicellar polymerization provides an additional route by which rubber compound properties may be optimized for a given application.

Finally, aging studies showed that 22 hours at 100° C did not seriously degrade any reinforced rubber physical properties and that some physical properties actually improved with aging.