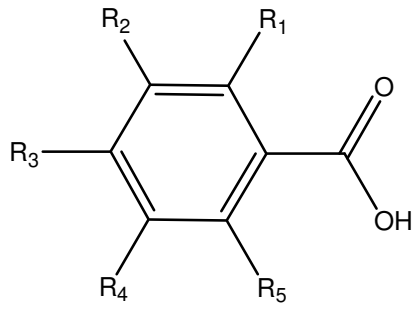
Claims:

1. A process for producing an allylic alcohol functionalized butyl rubber, the process comprising contacting an epoxidized butyl rubber with benzoic acid, an analogue of benzoic acid or a C_1-C_7 alkanoic acid in an absence of a solvent, wherein the benzoic acid or analogue of benzoic acid is a compound of formula (I):



(I)

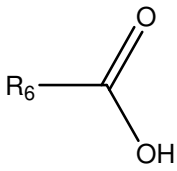
where R_1, R_2, R_3, R_4 and R_5 are independently hydrogen, methyl, ethyl, phenyl, chloro or bromo.

2. The process according to claim 1, wherein the epoxidized butyl rubber is contacted with the benzoic acid or analogue of benzoic acid.

3. The process according to claim 1, wherein the benzoic acid or analogue of benzoic acid comprises *meta*-chlorobenzoic acid.

4. The process according to claim 1, wherein the epoxidized butyl rubber is contacted with the C_1-C_7 alkanoic acid.

5. The process according to claim 4, wherein the C_1-C_7 alkanoic acid is a compound of formula (II):



(II)

where R_6 is hydrogen, methyl, ethyl, propyl, butyl, pentyl or hexyl.

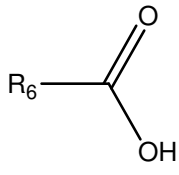
6. The process according to claim 1, wherein the allylic alcohol functionalized butyl rubber is produced from the epoxidized butyl rubber and the acid at a temperature of about 95°C or greater.

7. The process according to claim 1, wherein the epoxidized butyl rubber is contacted with the acid for an amount of time of about 10 minutes or greater.

8. The process according to claim 1, wherein:

the benzoic acid or analogue of benzoic acid comprises *meta*-chlorobenzoic acid;

the C_1-C_7 alkanoic acid is a compound of formula (II):



(II)

where R_6 is hydrogen, methyl, ethyl, propyl, butyl, pentyl or hexyl; and

the epoxidized butyl rubber comprises an isoolefin copolymer comprising repeating units derived from at least one isoolefin monomer and repeating units derived from at least one multiolefin monomer.

9. The process according to claim 8, wherein:

the isoolefin monomer comprises isobutene and/or wherein the at least one multiolefin monomer comprises isoprene;

the butyl rubber is a non-halogenated butyl rubber;

the contacting is done at a temperature of about 140 °C to about 180 °C, and for a period of time of about 10 minutes or greater.

10. The process according to claim 8, wherein:

the isoolefin monomer comprises isobutene and/or wherein the at least one multiolefin monomer comprises isoprene;

the butyl rubber is a halogenated butyl rubber;

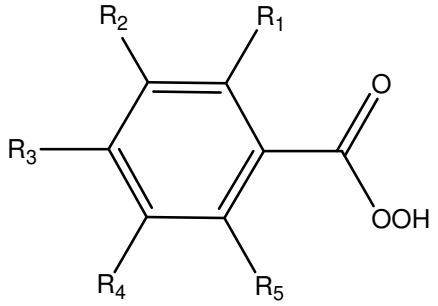
the contacting is done at a temperature of about 140 °C to about 180 °C, and for a period of time of about 10 minutes or greater.

11. A process for producing an allylic alcohol functionalized butyl rubber, the process comprising:

epoxidizing a butyl rubber with peroxybenzoic acid, an analogue of peroxybenzoic acid or a C_1-C_7 peroxyalkanoic acid in an absence of a solvent to form a polymer compound comprising the epoxidized butyl rubber and the benzoic acid, analogue of benzoic acid or C_1-C_7 alkanoic acid, and

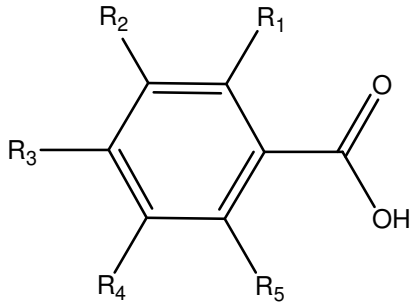
producing allylic alcohol functionalized butyl rubber *in situ* from the epoxidized butyl rubber and the benzoic acid, analogue of benzoic acid or C_1-C_7 alkanoic acid,

wherein the peroxybenzoic acid or analogue of peroxybenzoic acid is a compound of formula (III):



(III)

where R_1, R_2, R_3, R_4 and R_5 are independently hydrogen, methyl, ethyl, phenyl, chloro or bromo; and the benzoic acid or analogue of benzoic acid is a compound of formula (I):



(I)

where R_1, R_2, R_3, R_4 and R_5 are independently hydrogen, methyl, ethyl, phenyl, chloro or bromo.

12. The process according to claim 11, wherein the butyl rubber is a non-halogenated butyl rubber.

13. The process according to claim 11, wherein the butyl rubber comprises an isoolefin copolymer comprising repeating units derived from at least one isoolefin monomer and repeating units derived from at least one multiolefin monomer.

14. The process according to claim 13, wherein the isoolefin monomer comprises isobutene and/or wherein the at least one multiolefin monomer comprises isoprene.

15. The process according to claim 11, wherein:

the butyl rubber is a non-halogenated; and

the butyl rubber comprises an isoolefin copolymer comprising repeating units derived from at least one isoolefin monomer and repeating units derived from at least one multiolefin monomer.

16. The process according to claim 15, wherein the isoolefin monomer comprises isobutene and/or wherein the at least one multiolefin monomer comprises isoprene.

17. The process according to claim 11, wherein:

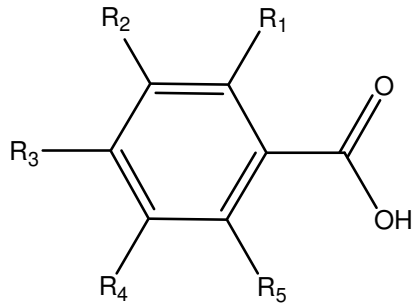
the butyl rubber is a halogenated butyl rubber; and

optionally wherein the butyl rubber comprises an isoolefin copolymer comprising repeating units derived from at least one isoolefin monomer and repeating units derived from at least one multiolefin monomer.

18. A polymer compound comprising:

an epoxidized butyl rubber; and

an acid selected from benzoic acid or an analogue of benzoic acid, wherein the benzoic acid or analogue of benzoic acid is a compound of formula (I):



(I)

where R_1, R_2, R_3, R_4 and R_5 are independently hydrogen, methyl, ethyl, phenyl, chloro or bromo.

19. The polymer compound according to claim 18, wherein: the benzoic acid or analogue of benzoic acid comprises *meta*-chlorobenzoic acid.

20. The polymer compound according to any one of claim 18 produced by mixing the butyl rubber and the benzoic acid or the analogue of benzoic acid in an absence of solvent.