WHAT IS CLAIMED IS:

1. A method of increasing the solubility of a synthetic polymer, the method~~chemical~~ comprising:

treating ~~a~~ the synthetic polymer with irradiation to ~~increase the solubility of the polymer~~produce an irradiated synthetic polymer with increased solubility relative to the solubility of the synthetic polymer prior to the irradiation ~~treatment~~, wherein the synthetic polymer is a polar macromolecule, a nonpolar polymer or a low polarity polymer.

~~2. The method of claim 1 wherein the polymer is a polar macromolecule.~~

~~3. The method of claim 1 wherein the polymer is a nonpolar or low polarity polymer.~~

4~~2~~. ~~The method of claim 1, wherein the polymer~~A method of increasing the solubility of a synthetic polymer, the method comprising: treating the synthetic polymer with irradiation to produce an irradiated synthetic polymer with increased solubility relative to the solubility of the synthetic polymer prior to the irradiation, wherein the synthetic polymer is selected from the group consisting of latex, acrylics, polyurethanes, polyesters, polyethylenes, polystyrenes, polybutadienes, and polyamides.

~~5~~3. The method of any one of the above claims, wherein the irradiation changes the functionality of the polymer.

~~6~~4. The method of any one of the above claims, wherein the irradiation is done in the presence of an oxidant and the polymer is oxidized.

~~7~~5. The method of any one of the above claims, wherein the irradiation decreases the molecular weight of the polymer.

~~8~~6. The method of any one of the above claims, wherein ~~irradiating~~ the irradiation comprises exposing the polymer to an electron beam.

~~9~~7. The method of any one of the above claims, wherein ~~irradiating~~ the irradiation comprises applying to the polymer a total dose of radiation of at least 5 Mrads.

~~10~~8. The method of any one of the above claims, wherein the irradiated polymer has a crystallinity that is at least 10 percent lower than the crystallinity of the ~~chemical~~ polymer prior to ~~physical treatment~~the irradiation.

~~11~~9. The method of any one of the above claims, wherein the ~~chemical had~~synthetic polymer has a crystallinity index prior to physical treatment of from about 40 to about 87.5 percent, and the ~~physically treated chemical~~irradiated synthetic polymer has a crystallinity index of from about 10 to about 50 percent.

~~12~~10. The method of any one of the above claims, wherein the irradiation ~~treatment~~ increases the solubility of the polymer in water.

~~13~~11. The method of any one of the above claims, wherein the irradiated polymer is more brittle than the polymer prior to ~~treatment with~~ irradiation.

~~14~~12. The method of any one of the above claims further comprising mechanically treating the polymer after the irradiation ~~treatment~~.

~~15~~13. A product comprising:

a synthetic polymer that has been treated with irradiation ~~and wherein the polymer has~~to produce an irradiated synthetic polymer having a solubility that is higher than the solubility of the synthetic polymer prior to the irradiation, wherein the synthetic polymer is a polar macromolecule, a nonpolar polymer or a low polarity polymer ~~treatment~~.

~~16. The product of claim 15, wherein the polymer is a polar macromolecule.~~

~~17. The product of claim 15, wherein the polymer is a nonpolar or low polarity polymer.~~

~~18~~14. The product of ~~any one of claims 15-17~~claim 13, wherein the irradiated polymer has a functionality that is different from that of the polymer prior to the irradiation ~~treatment~~.

~~19~~15. The product of ~~any one of claims 15-18~~claim 13 or 14, wherein the ~~polymer has been irradiated by exposing the polymer to~~irradiation is from an electron beam.

~~20~~16. The product of any one of claims ~~15-19~~13-15, wherein the polymer has been ~~irradiated with a total dose of radiation~~treated with irradiation of at least 5 Mrads.

~~21~~17. The product of any one of claims ~~15-20~~13-16, wherein the irradiated polymer has a crystallinity that is at least 10 percent lower than the crystallinity of the polymer prior to the irradiation ~~treatment~~.

~~22~~18. The product of any one of claims ~~15-21~~13-17, wherein the polymer, prior to irradiation, ~~had~~ has a crystallinity index ~~prior to physical treatment~~ of from about 40 to about 87.5 percent, and the irradiated polymer has a crystallinity index of from about 10 to about 50 percent.