WHAT IS CLAIMED IS:

1. A method of increasing the solubility of a chemical comprising treating the chemical with a physical treatment selected from the group consisting of mechanical treatment, chemical treatment, radiation, sonication, oxidation, pyrolysis and steam explosion to increase the solubility of the chemical relative to the solubility of the chemical prior to physical treatment.

2. The method of claim 1 wherein the chemical is selected from the group consisting of salts, polymers and monomers.

3. The method of claim 1 wherein the physical treatment comprises irradiation.

4. The method of claim 1 wherein the physical treatment changes the functionality of the chemical.

5. The method of claim 3 wherein irradiating comprises exposing the chemical to an electron beam.

6. The method of claim 3 wherein irradiating comprises applying to the chemical a total dose of radiation of at least 5 Mrads.

7. The method of claim 1 wherein the physically treated chemical has a crystallinity that is at least 10 percent lower than the crystallinity of the chemical prior to physical treatment.

8. The method of claim 1 wherein the chemical had a crystallinity index prior to physical treatment of from about 40 to about 87.5 percent, and the physically treated chemical has a crystallinity index of from about 10 to about 50 percent.

9. A product comprising a chemical that has been treated with a physical treatment selected from the group consisting of mechanical treatment, chemical treatment, radiation, sonication, oxidation, pyrolysis and steam explosion, the product having a solubility that is higher than the solubility of the chemical prior to physical treatment.

10. The product of claim 9 wherein the chemical is selected from the group consisting of salts, polymers and monomers.

11. The product of claim 9 wherein the chemical has been irradiated.

12. The product of claim 9 wherein the product has a functionality that is different from that of the chemical prior to physical treatment.

13. The product of claim 11 wherein the chemical has been irradiated by exposing the chemical to an electron beam.

14. The product of claim 11 wherein the chemical has been irradiated with a total dose of radiation of at least 5 Mrads.

15. The product of claim 9 wherein the physically treated chemical has a crystallinity that is at least 10 percent lower than the crystallinity of the chemical prior to physical treatment.

16. The product of claim 9 wherein the chemical had a crystallinity index prior to physical treatment of from about 40 to about 87.5 percent, and the physically treated chemical has a crystallinity index of from about 10 to about 50 percent.

WHAT IS CLAIMED IS:

1. A method of increasing the solubility of a chemical comprising:

treating a synthetic polymer with irradiation to increase the solubility of the polymer relative to the solubility of the polymer prior to the irradiation treatment.

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. The method of claim 1, wherein the polymer is selected from the group consisting of latex, acrylics, polyurethanes, polyesters, polyethylenes, polystyrenes, polybutadienes, and polyamides.

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

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

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

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

10. 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 prior to physical treatment.

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

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

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

15. A product comprising:

a synthetic polymer that has been treated with irradiation and wherein the polymer has a solubility that is higher than the solubility of the polymer prior to the irradiation 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. The product of any one of claims 15-17, wherein the irradiated polymer has a functionality that is different from that of the polymer prior to the irradiation treatment.

19. The product of any one of claims 15-18, wherein the polymer has been irradiated by exposing the polymer to an electron beam.

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

21. The product of any one of claims 15-20, 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. The product of any one of claims 15-21, wherein the polymer had 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.