Recommended Reading List:

1. Paul Anastas, et al. (2016). "“Happy silver anniversary”: Green Chemistry at 25." Green Chemistry **18**(1): 12-13.

2. Coish, P., et al. (2016). Current Status and Future Challenges in Molecular Design for Reduced Hazard, American Chemical Society.

3. Anastas, P. T. and J. B. Zimmerman (2016). "Safer by Design." Green Chemistry **18**(16):4324-4324.

4. Anastas, P. T. and D. T. Allen (2016). Twenty-Five Years of Green Chemistry and Green Engineering: The End of the Beginning, American Chemical Society.

5. Zimmerman, J. B. and P. T. Anastas (2015). "Toward designing safer chemicals." Science **347**(6219): 215-215.

6. Zimmerman, J. B. and P. T. Anastas (2015). "Toward substitution with no regrets." Science **347**(6227): 1198-1199.

7. Matus, K. J. M., et al. (2012). "Barriers to the Implementation of Green Chemistry in the United States." Environmental Science & Technology **46**(20): 10892-10899.

8. Li, C.-J. and P. T. Anastas (2012). "Green Chemistry: present and future." Chemical Society Reviews **41**(4): 1413-1414.

9. Mulvihill, M. J., et al. (2011). "Green Chemistry and Green Engineering: A Framework for Sustainable Technology Development." Annual Review of Environmental and Resources **36**: 271 - 293.
   Green chemistry and engineering seek to maximize efficiency and minimize health and environmental hazards throughout the chemical production process. This review demonstrates how green chemistry principles and metrics can influence the entire life cycle of a chemical from design through disposal. After reviewing essential metrics and recent advances in the field within this context, we consider the case of nanotechnology. As an emerging field, nanotechnology provides an instructive framework to consider the influence and application of green chemistry. Interdisciplinary innovation guides both fields, and both seek to transform the nature of technology. The applications and implications of emerging green technology are discussed, and future opportunities for interdisciplinary collaborations are highlighted.

10. Cui, Z., et al. (2011). "Green chemistry in China." Pure and Applied Chemistry **83**(7): 1379-1390.
    The principles of green chemistry provide a framework for rational design of environmentally friendly chemicals and chemical processes having reduced intrinsic hazard. In China, the academic community has made advances in key areas, developing new catalysts, solvents, polymers, plastics additives, and biomass transformations that add to the “toolbox” of alternative, more benign, and transformative technologies. Educational and outreach activities have also flourished in recent years. This perspective highlights examples of green chemistry breakthroughs in China, focusing on literature reports from 2008 to 2010. While we cannot hope to be comprehensive, we aim to provide examples that demonstrate the scope of the current research field.

11. Norvig, P., et al. (2010). "2020 visions." Nature **463**(7277): 26-32.

12. Anastas, P. T. and N. Eghbali (2010). "Green Chemistry: Principles and Practice." Chemical Society Reviews **39**(1): 301-312.
Green Chemistry is a relatively new emerging field that strives to work at the molecular level to achieve sustainability. The field has received widespread interest in the past decade due to its ability to harness chemical innovation to meet environmental and economic goals simultaneously. Green Chemistry has a framework of a cohesive set of Twelve Principles, which have been systematically surveyed in this critical review. This article covers the concepts of design and the scientific philosophy of Green Chemistry with a set of illustrative examples. Future trends in Green Chemistry are discussed with the challenge of using the Principles as a cohesive design system (93 references).

13. Anastas, P. T. (2010). Preface. Biomass to Biofuels: Strategies for Global Industries. A. Vertes, N. Qureshi, H. Yukawa and H. Blaschek, John Wiley & Sons, Ltd**:** 584.

14. Anastas, P. T., Ed. (2009-2011). Handbook of Green Chemistry (9 volumes).

15. Shukla, S. S., et al. (2009). "The Need and the Quest for Developing Water Treatment Systems for Masses Which are Low Cost, Low Tech and Use Locally or Easily Available Material." Clean Technology 2009: Bioenergy, Renewables, Storage, Grid, Waste and Sustainability: 281-284.
In today's world, a large set of environmental challenges exist. The extent of the environmental damage is alarming and the consequences could be dire. Existence of healthy life requires availability of safe food and clean water. Though food supply seem to have improved in last 25 years, the emerging industrialization (in almost every corner of the world) has rapidly caused serious deterioration in water quality. The water supply is limited and we cannot make more water (as we can probably do with food). The consequences of drinking polluted water may not appears NOW but the price may be very high for the future generations to pay. Many people exposed and affected by polluted water are the ones who can least afford to buy clean water. For the past 20 years, we have engaged ourselves in developing Low Cost, Low Tech Water Treatment Methods Using Locally Available Material. These methods help to destroy organics and bacteria, and remove metal ions from water for individual consumption. Our methods however, can also be adopted for large bodies of water such as rivers and lakes. We are now attempting to establish a nonprofit organization to seek funding to spread our technologies amongst the people who can least afford to buy clean water

16. Beach, E. S., et al. (2009). "Green Chemistry: A design framework for sustainability." Energy & Environmental Science **2**(10): 1038-1049.
In this review we will highlight some of the science that exemplifies the principles of Green Chemistry, in particular the efficient use of materials and energy, development of renewable resources, and design for reduced hazard. Examples are drawn from a diverse range of research fields including catalysis, alternative solvents, analytical chemistry, polymer science, and toxicology. While it is impossible for us to be comprehensive, as the worldwide proliferation of Green Chemistry research, industrial application, conferences, networks, and journals has led to a wealth of innovation, the review will attempt to illustrate how progress has been made toward solving the sustainability goals of the 21st century by engaging at the molecular level.

17. Anastas, P. T. (2009). "The transformative innovations needed by green chemistry for sustainability." ChemSusChem **2**(5): 391-392.
Green chemistry is discussed as a central design framework for the implementation of new

scientific knowledge into everyday life. When addressed in such a manner, sustainability and economic viability are not necessarily mutually exclusive.

18. Manley, J. B., et al. (2008). "Frontiers in Green Chemistry: meeting the grand challenges for sustainability in R&D and manufacturing." Journal of Cleaner Production **16**(6): 743-750.
Green Chemistry is the design, development, and implementation of chemical products and processes to reduce or eliminate the use and generation of substances hazardous to human health and the environment. It is an innovative, non-regulatory, economically driven approach toward sustainability. The unequivocal value of Green Chemistry to the business and to the environment is illustrated through industrial examples. Green Chemistry must be recognized for its ability to address sustainability at the molecular level. By designing for sustainability at this fundamental level, Green Chemistry challenges innovators to design and utilize matter and energy in a way that increases performance and value while protecting human health and the environment. The principles of Green Chemistry today need to become the core for tomorrow's chemistry, integrating sustainability into science and its innovations.

19. Horvath, I. T. and P. T. Anastas (2007). "Innovations and Green Chemistry." Chemical Reviews **107**(6): 2169-2173.

20. Anastas, P. T. and E. S. Beach (2007). "Green chemistry: the emergence of a transformative framework." Green Chemistry Letters and Reviews **1**(1): 9-24.
Since the Twelve Principles of Green Chemistry were formulated in the 1990s, there have been tremendous successes in developing new products and processes to be more compatible with human health, the environment, and sustainability goals. This review gives a sampling of research successes from the last 20years, including advances in synthetic efficiency, application of alternative synthetic methods, use of less hazardous solvents and reagents, and development of renewable resources for chemical feedstocks. The future of green chemistry will depend on innovations that consolidate and integrate these achievements that have been made, using all Twelve Principles as a framework for intentional design. Designing for sustainability and reduced hazard should not be viewed as constraining, but rather as providing the freedom to explore and invent, bridging continents and scientific disciplines to create new solutions.

21. Zimmerman, J. B. and P. T. Anastas (2006). When Is a Waste not a Waste? Sustainability Science and Engineering: Defining Principles. M. A. Abraham, Elsevier Science**:** 201-221.

22. Anastas, P. T. and J. B. Zimmerman (2006). The Twelve Principles of Green Engineering as a Foundation for Sustainability. Sustainability Science and Engineering: Defining Principles. M. A. Abraham, Elsevier Science**:** 11-32.

23. Anastas, P. T. (2004). "Green chemistry: Definition and principles." Abstracts of Papers of the American Chemical Society **228**: U760-U760.

24. Anastas, P. T. and M. M. Kirchhoff (2003). "Green chemistry: From command and control to pollution prevention." Abstracts of Papers of the American Chemical Society **225**: U946-U946.

25. Anastas, P. T. and J. C. Warner (1998). Green Chemistry: Theory and Practice, Oxford University Press.