

- 1. Green chemistry aims to?**
 - a) Design chemical products and process that maximize profits
 - b) Design safer chemical products and processes that reduce or eliminate the use and generation of hazardous substances
 - c) Design chemical products and processes that work most efficiently
 - d) Utilize non-renewable energy
- 2. Dr. Paul Anastas & Dr. John Warner created 10 Principles of Green Chemistry to reduce or eliminate the use and generation of hazardous substances?**
 - a) True
 - b) False
- 3. Which of the following are among the 12 Principles of Green Chemistry?**
 - a) Design commercially viable products
 - b) Use only new solvents
 - c) Use catalysts, not stoichiometric reagents
 - d) Re-use waste
- 4. Green chemists reduce risk by?**
 - a) Reducing the hazard inherent in a chemical product or process
 - b) Minimizing the use of all chemicals
 - c) Inventing technologies that will clean up toxic sites
 - d) Developing recycled products
- 5. Which of the following is a challenge for green chemists?**
 - a) Awareness of the benefits of green chemistry
 - b) Developing chemicals that are recyclable
 - c) Training for cleaning up chemical spills
 - d) Knowing when to reduce and eliminate hazardous waste
- 6. Business benefits of green chemistry include?**
 - a) Reduced costs associated with waste treatment and disposal
 - b) Innovating 'greener' products to entice customers
 - c) Greater compliance with environmental legislation
 - d) All of the above
- 7. Green chemistry is more expensive than traditional chemistry?**
 - a) True
 - b) False
- 8. What is the U.S. Presidential Green Chemistry Challenge Award?**
 - a) An award related to recycling
 - b) An award for industry only
 - c) The only chemistry award given by the President
 - d) Challenges companies to become fuel efficient

9. Since 1996, Presidential Green Chemistry Challenge Award winning technologies have helped save or eliminate at least 1.3 billion pounds of hazardous chemicals and solvents?

- a) True
- b) False

10. The first listed of the 12 Principles of Green Chemistry is?

- a) Prevent waste
- b) Catalysis
- c) Atom economy
- d) Benign solvents

11. This word is synonymous with green chemistry and also means harmless, or gentle and not life threatening?

- a) Sustainable
- b) Benign
- c) User friendly
- d) Greenness

12. Which of the following is the greenest solvent?

- a) Formaldehyde
- b) Benzene
- c) Ethanol
- d) Water



13. The figure above shows a process that is often used as part of which 'green' product design system?

- a) Market Flow Analysis
- b) Customer Market Flow Analysis
- c) Life Cycle Assessment
- d) Product Life Analysis

14. The definition of green chemistry is the same as the definition of sustainability?

- a) True
- b) False

15. The term which refers to the breakup within a compound due to microbial activity is?

- a) Microbial degradation
- b) Agro-degradation
- c) Photo-degradation
- d) Decomposition

16. Which one of the following three terms is used in the 'sustainability triangle'?

- a) Micro-economics
- b) Planet
- c) Social responsibility

17. The term used to measure a product or person's environmental impact is?

- a) Handprint
- b) CO₂ print
- c) Footprint
- d) Hazardous print

18. Used to indicate the level of contaminants present, the term 'PPM' means?

- a) Parts-per-micron
- b) Parts-per-million
- c) Parts-per-mass
- d) Parts-per-molecule

19. Environmental benefits of green chemistry include?

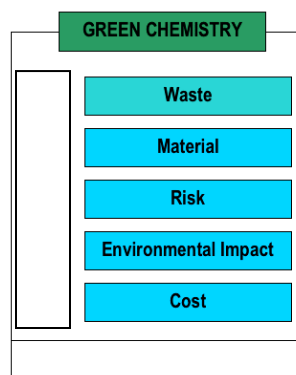
- a) Fewer raw materials and natural resources used
- b) Cleaner production technologies & reduced emissions
- c) Smaller quantities of hazardous waste to be treated and disposed of
- d) All of the above

20. The term missing in Risk = Hazard x _____ is?

- a) Exposure
- b) Cancer
- c) Benign
- d) Reactivity

21. The following term refers to the relative proportion of chemical components?

- a) Togetherness
- b) Stoichiometry
- c) Metric
- d) Colligative



22. The word missing on the left side of the figure above is?

- a) Enhancing
- b) Facilitating
- c) Reducing
- d) Awareness

23. _____ is fulfilling the needs of the present generation without compromising the ability of future generations to meet their needs?
- Sustainability
 - Green chemistry
 - Life Cycle Assessment
 - Recycling
24. _____ and moral arguments are often used when discussing sustainability and green chemistry?
- Environment
 - Technology
 - Politics
 - Ethics
25. _____, or VOCs, have been replaced and were banned in some paints?
- Versatile Organic Chemicals
 - Volatile Organic Compounds
 - Volatile Organic Components
 - Versatile Odorless Components
26. Shortly after mid-night in 1984, a reaction caused poisonous methyl isocyanate gas to leak from a factory in this city, _____ causing 3,700 deaths?
- Bhopal
 - Hinkley
 - Calcutta
 - Siberia
27. In the late 1960's, the Cuyahoga River in Ohio overloaded with chemical pollutants and _____?
- Killed fish
 - Polluted surrounding soil
 - Caused foaming
 - Caught fire
28. Benzene, a _____ substance, is an important industrial solvent used in the production of pharmaceuticals, plastics, and dyes?
- Odorless
 - Non-flammable
 - Biodegradable
 - Carcinogenic

29. The following legislation gave birth to today's green chemistry initiatives?
- Clean Water Act of 1972
 - Montreal Protocol of 1989
 - Pollution Prevention Act of 1990
 - Superfund Act of 1980
30. In 1998, this state signed green chemistry legislation promising to remove politics from the evaluation of disputed chemicals?
- Oregon
 - California
 - New York
 - Florida
31. The following is often referred to as the universal solvent and is a preferred green solvent?
- Water
 - Methanol
 - Ethyl Acetate
 - Benzene
32. A chemical process with an E-Factor of 1 creates LESS waste than an E-Factor of 25?
- True
 - False
33. Lignin, switch grass, and cellulose are all types of _____?
- Enzymes
 - Catalysts
 - Bio-based feedstock's
 - Anti-cancer compounds
34. _____ is an excellent 'green' solvent as well as a greenhouse gas?
- Methanol
 - CFCs
 - Carbon monoxide
 - Carbon Dioxide
35. _____ interfere with hormone systems in animals and humans and are abbreviated EDC's?
- Endocrine Destructive Components
 - Energy Disrupting Chemicals
 - Endocrine Disrupting Chemicals
 - Enzyme Destructive Components
36. Green chemistry can provide green technology solutions for a sustainable future?
- True
 - False

37. Soybean is used to replace traditional inks in printer cartridges, highlighting which of the Green chemistry principles?
- Atom economy
 - Use of Renewable Feedstock's
 - Reduce derivatives
 - Prevent waste
38. Bio-polymers exemplify Green Chemistry Principle # 10, which is?
- Catalysis
 - Prevent waste
 - Benign solvents & auxiliaries
 - Design for degradation
39. The use of solar power is covered within Green Chemistry Principle #6, which is?
- Atom economy
 - Design for energy efficiency
 - Design benign chemicals
 - Less hazardous synthesis
40. _____ was instrumental in winning a 1996 legal settlement of \$333 million for the California town of Hinkley due to chromium in its drinking water?
- Leonardo diCaprio
 - George Clooney
 - Erin Brockovich
 - Angelina Jolie
41. _____ was a co-founder of the worldwide green chemistry movement and the first director of the Green Chemistry Institute, now part of ACS?
- Joseph Breen
 - Albert Einstein
 - John Warner
 - Paul Anastas
42. This 'green' chemical is used in household cleaners to remove stains and is also a favorite dressing on salads!?
- Vinegar (acetic acid)
 - Citric acid
 - Hydrochloric acid (HCl)
 - Water

- 43. An example of green chemistry is?**
- Recycled carpet
 - A product made on Earth Day
 - A sublimation reaction
 - Bio-plastics
- 44. Biodiesel is an example of which of the 12 Principles of Green Chemistry?**
- #1 – Waste prevention
 - #7 – Use of renewable feedstocks
 - #9 – Use of catalysis
 - #5 – Safer solvents
- 45. Green chemistry can reduce all but which of the following?**
- Cost
 - Risk & Hazard
 - Awareness
 - Waste
- 46. A 'green' soy adhesive was developed based on the adhesion protein secreted by mussels sticking on rocks?**
- True
 - False
- 47. An example of chemical toxics prevention is?**
- Removing water from industrial reactions
 - Eliminating the formation of chlorinated organics in paper
 - Utilizing ammonia instead of vinegar
 - Monitoring BPA (Bisphenol A) in plastic bottles
- 48. Green chemistry synthesis could also involve which of the following?**
- High temperature
 - Dichloromethane
 - Fossil fuels
 - Microwave
- 49. Bio-catalysis has become very useful in green chemistry manufacturing?**
- True
 - False
- 50. TRI is used by the EPA to track pollution prevention. TRI stands for?**
- Total Reporting Inventory
 - Total Release Impact
 - Toxic Release Inventory
 - Toxic Release Impact

TEST ANSWERS

- | | |
|-------|-------|
| 1) b | 27) d |
| 2) b | 28) d |
| 3) c | 29) c |
| 4) a | 30) b |
| 5) d | 31) a |
| 6) d | 32) a |
| 7) b | 33) c |
| 8) c | 34) d |
| 9) a | 35) c |
| 10) a | 36) a |
| 11) b | 37) b |
| 12) d | 38) d |
| 13) c | 39) b |
| 14) b | 40) c |
| 15) a | 41) d |
| 16) c | 42) a |
| 17) c | 43) d |
| 18) b | 44) b |
| 19) d | 45) c |
| 20) a | 46) a |
| 21) b | 47) b |
| 22) c | 48) d |
| 23) a | 49) a |
| 24) d | 50) c |
| 25) b | |
| 26) a | |