**Questions: Note to instructor: Below is a list of questions that are suitable for a exam. You may select any number of question that you may feel is best suited for your class. This serves a mere guide and any additional questions are welcome.**

**Questions for Exam 2**

1. **What is the Sustainability?**
2. **List the 12 Principles of Green Chemistry at align with Sustainability**
3. **What are the 3 criteria’s that sustainability tries to achieve?**
4. **What are the United Nations Sustainability Development Goals? Give two examples of UN Sustainability Development Goals that align with Green Chemistry.**
5. **Define Life Cycle Assessment.**
6. **Fill in the process diagram for the phases and stages of a full LCA**
7. **Why do companies perform LCA? List 2 of the 4 reasons.**
8. **What is Circular Economy?**
9. **How is Circular Economy different from LCA?**
10. **Define a renewable resource/feedstock.**
11. **What has to be satisfied to ensure a resource/feedstock as a viable renewable resource?**
12. **Provide a list of 5 types of renewable resources used a to make platform materials**.
13. **What is Pyrolysis?**
14. **Explain the ABE process. What type of feedstock are needed for the process? Can it use renewable feedstocks to make bio-based ABE?**
15. **For companies who have won the Presidential Green Chemistry Awards, what were the benefits of implementing the 12 Principles of Green Chemistry?** Instructor may reference a specific case study that he/she assigns the class to read.
16. **For companies that have implemented Green Chemistry into their research, how has Green Chemistry saved money? Applying certain Principles are acceptable.**
17. **You are an intern at a chemical company. Shortly after starting, you noticed that the research lab wasn’t very concerned with the hazards associated with the products they were making. You noticed that solvent usage wasn’t a concern, chemists were producing a lot of organic waste, and the lab had a noticeable chemical odor. What 12 principles apply and could help the lab? Explain?**
18. **What is a Solvent?**
19. **What are some everyday uses where solvents are vital?**
20. **Chemistry behind solvents. Provide three reasons.**
21. **What are VOC’s? Why is it troublesome.**
22. **Using the GlaxoSmithKline Solvent Guide. Which solvents have less issues.**
23. **What are the disadvantages of using solvents?**
24. **List 3 alternatives to performing chemistry without solvents.**
25. **How is a supercritical fluid defined?**
26. **Where on the phase transition graph is supercritical fluids?**
27. **What unique properties do supercritical fluids offer over traditional solvents?**

1. **What are the disadvantages of supercritical fluids?**
2. **What are ionic liquids? How are they green alternatives to solvents?**
3. **Advantages of Ionic Liquids?**
4. **Disadvantages of Ionic Liquids?**
5. **Advantages to water-based chemistry?**
6. **Disadvantages to water-based chemistry?**
7. **Explain what an extruder is? What type of chemistry can if facilitate.**
8. **How does a ball-mill work for chemical reactions?**
9. **Instead of the traditional heat, pressure, and mixing variables, what does a ball mill leverage to make chemical reactions happen?**
10. **Explain catalysis.**
11. **Doesn’t adding a catalyst increase the amount of raw materials in any given process? Agree or disagree?**
12. **Advantages of using a catalyst?**
13. **Disadvantages of catalysis?**
14. **What are the two types of catalysis?**
15. **What’s the difference between homogeneous and heterogeneous catalysis?**
16. **Advantages and Disadvantages of catalysis?**
17. **Draw the reaction progress diagram showing a reaction with a catalyst and without a catalyst.**
18. **What is biocatalysis?**
19. **Advantages and Disadvantages of using biocatalysis?**

**Previous exam question to ensure student understand nomenclature and structures**

1. **Provide the correct nomenclature for the following compounds (common names are acceptable):**

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1. **Draw the correct structures for the following names:**
2. **2,4-Dimethylheptane**
3. **2-Methyl-4-octene**
4. **1-Chloro-2-methylcyclopentane**
5. **Draw the correct structures for the following names:**
6. **Phenol**
7. **6-Methylheptanol**
8. **1-Methylcyclobutane**
9. **3-ethyl-2,4-dimethylhexane**
10. **3-ethyl-2-methylheptane**
11. **1-bromo-2-fluorocyclohexane**
12. **Cyclobutane**
13. **Name one type of way Green Chemistry is changing the way chemical reactions are performed.**
14. **Why does Green Chemistry look at nature for future reactions? What does nature do that is hard to perform in the lab?**
15. **Name the following functional groups**

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1. **Atorvastatin is a “statin” lowering drug what has a range of functional groups. Identify all the functional groups in the compound Atorvastatin.**



1. **Here is the structure of specialty compound that can be used in reversible reactions to block the amino acid residues in proteins. What functional groups are associated with this compound? (This one is tricky)**

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