

Name: _____

Date: _____

Introduction to Lifecycle Analysis (based on our PowerPoint discussion)

1. Write down some products that were discussed and shown in the slide show.

2. Name some problems with the materials used in these products

3. Go back to your prior thinking of sustainability.

- a. Jot down your own simple idea on what it means.

- b. Can you come up with simple ideas on how you can offer a more sustainable community today?

4. Based on the cradle to cradle video, why do you think the term is called "cradle to cradle?" Is recycling cradle to cradle?

5. Sketch a simple lifecycle diagram for polystyrene below: (is it open or closed-loop?)



6. How does polystyrene connect to our 12 principles of Green Chemistry?

7. Is there a sustainable alternative to styrofoam, known as polystyrene? If so, what is it?

Teacher Copy:

Introduction to Lifecycle Analysis (based on our PowerPoint discussion)

1. Write down some consumer products that were discussed and shown in the slide show.

Not all answers need to be given. Some of the many consumer products include:

- Paper - writing, packaging
- Plastics - containers, toys, medical instruments, clothing/footwear, electronics
- Metals - wire, foil, car parts, building materials, cooking utensils
- Glass - lenses, windows
- Ceramics - dishes, building materials, toilets, bone/tooth replacements
- Semiconductors - electronics
- Composites - athletic equipment, spacecraft, insulation, car parts

2. Name some problems with the materials used in these products.

- Paper - large amounts of wood pulp and water are used in manufacturing
- Plastics - involves potentially toxic solvents and starting materials
- Metals - require high temperatures and harmful chemicals to purify
- Glass and Ceramics - need high temperatures and occasionally use heavy metals for coloring
- Semiconductors - can contain toxic heavy metals
- Composites - can involve toxic substances and high temperatures

3. Go back to your prior thinking of sustainability.

- Jot down your own simple idea of what it means.

There are many definitions but there should be a theme for the balance and harmony between human civilization and the environment.

- Can you come up with simple ideas on how you can offer a more sustainable community today?

Some ideas include reducing or eliminating buying new clothes when we can repair our existing clothes, removing the “fast fashion” industries that cause a major problem in the environment.

Looking at our regularly used products and articles like paper towels and cleaning products. Do we need to use paper towels? Is this sustainable? Can we use cloth rags and clean them instead of throwing away paper towels? How about our cleaning products? Can we use chemicals that are less harmful like vinegar? Can we walk to a place instead of using a car if it's safe? Can we drink from reusable bottles? How can we change our paper waste and turn it into a digital document?

4. Based on the cradle to cradle video, why do you think the term is called “cradle to cradle?” Is recycling cradle to cradle?

The term plays off the popular corporate phrase "cradle to grave", implying that the cradle to cradle model is sustainable and considerate of life and future generations—from the birth, or "cradle", of one generation to the next generation, versus from birth to death, or "grave", within the same generation.

5. Sketch a simple lifecycle diagram for polystyrene below: (is it open or closed-loop?)

Non-renewable raw material → Multi-step manufacturing → Short-term use consumer product → Non-biodegradable & Limited recycling → Landfill!

6. How does polystyrene connect to our 12 principles of Green Chemistry?

Does NOT follow any of the principles!

- Principle 1: waste prevention → used styrofoam gets dumped in a landfill!
- Principle 2: atom economy → waste products during manufacturing are discarded
- Principle 3: minimize toxicity → styrene monomer is toxic
- Principle 5: safer solvents → manufacturing process uses toxic solvents
- Principle 6: energy efficiency → manufacturing process uses high heat
- Principle 7: renewable feedstocks → petroleum is non-renewable!
- Principle 10: design for degradation → styrofoam is non-biodegradable

7. Is there a sustainable alternative to styrofoam, known as polystyrene? If so, what is it?

Yes! Ecovative made from mycelium and agricultural waste