Biopolyesters: test the biodegradability claim

Student activity • observation and reasoning

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The question

Does a label specify where and how breakdown occurs?

Compare polymer structures and environmental claims. Explain why some polyesters biodegrade while a short visual test cannot establish complete biological breakdown.

Equipment

- Booklet, pencil, periodic table and optional molecular model kit

Desk activity only; keep small model pieces away from mouths.

Course coverage: Chemistry only: 4.50C, supported by recall of polymer disposal in 4.47.

Plan, model or apparatus sketch

Draw a labelled structure or model to explain your reasoning for this lesson.

Method and reasoning

Read the whole sequence before starting

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1. Identify ester links in a polyester and compare a poly(ethene) carbon backbone.

2. Explain that some polyester structures permit hydrolysis/biological breakdown under suitable conditions.

3. Compare the words bio-based, biodegradable and compostable; give a case where they need not coincide.

4. Read an invented claim: breaks down in 12 weeks. List the missing temperature, humidity, organisms, endpoint and test standard.

5. Distinguish fragmentation from conversion into biological breakdown products.

6. Propose an evidence-based disposal recommendation without assuming every polyester degrades in the sea or a garden.

Cleanup

• Return shared equipment and retain corrected reasoning.

Record your evidence

Blank spaces are for your own work

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Reference and task data

The 12-week claim is invented for critique, not a measured material result. Some biopolyesters are biodegradable under specified conditions; this does not apply to every polyester. Industrial compostability does not imply home, soil or marine biodegradability.

Task	My structure / working	Reason / correction
Structure		
Claim / missing evidence		
Disposal reasoning		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Which linkage distinguishes a polyester?

2. Are all polyesters readily biodegradable?

3. Does bio-based mean biodegradable?

4. Why does temperature matter to a test claim?

5. Is breaking into small pieces sufficient evidence?

6. What should a disposal label specify?