Polymers, Materials, and Recycling Evidence

Student Worksheet | g10_u07_w27

I can: interpret a supplied polymer-repeat model and compare material/recovery data with evidence-bounded conclusions.
Scope card: A polymer is a large molecule built from repeating units. This packet uses a simplified addition model in which $CH_2{=}CH_2$ is represented by repeat unit $[-CH_2-CH_2-]_n$. Cross-link count, load index, and recovery results are classroom data-card values, not product specifications. A recovery result under Program X is context-specific; it does not establish universal recyclability, sustainability, safety, health, consumer, or product claims. Use paper/data simulations only—no plastics, heating, cutting, or recycling activity.

material card	chain model	load index (units)	Program X recovery result
L	linear $[-CH_2-CH_2-]_n$, 0 cross-link markers	4	80% of sorted input recovered
N	network $[-CH_2-CH_2-]_n$, 6 cross-link markers	8	25% of sorted input recovered

1. Define a polymer using the scope card.

2. Identify the monomer pattern used in the supplied addition model.

3. Identify the repeat unit in the supplied addition model.

4. What does subscript n communicate in a polymer repeat representation?

5. In the simplified addition model, what bond-pattern change is represented when the monomer becomes a repeat unit?

6. Which card is linear and which is a network model? Cite cross-link markers.

7. Which card has the higher supplied load index?

8. Calculate the difference in load index between N and L.

9. Calculate the percent increase from L's load index to N's load index.

10. Which card has the higher listed Program X recovery result?

11. If Program X receives 400 kg of sorted L input, calculate the model recovered mass.

12. If Program X receives 400 kg of sorted N input, calculate the model recovered mass.

13. Calculate the difference in recovered mass for the two 400 kg model inputs.

14. What does "sorted input" mean for the scope of the listed recovery results?

15. State one evidence-bounded comparison between cross-link count and the supplied load-index values.

16. State one evidence-bounded comparison between material card and Program X recovery result.

17. Critique: "Card L is universally more sustainable because its Program X recovery is higher."

18. Critique: "Six cross-link markers prove that every network polymer has exactly the same property as card N."

19. List two additional context variables needed before extending a recovery card into a broader recycling, environmental, consumer, product, or health claim.

20. Write a cautious CER statement using one polymer-structure feature and one recovery or load calculation. Include a context/safety boundary.