

**Teacher’s Guide**

**5 Things to Know About Glitter**

***December 2023***

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Activate students’ prior knowledge and engage them before they read the article.

[***Reading Comprehension Questions***](#_3znysh7) ***3***

These questions are designed to help students read the article (and graphics) carefully. They can help the teacher assess how well students understand the content and help direct the need for follow-up discussions and/or activities. You’ll find the questions ordered in increasing difficulty.

[***Graphic Organizer***](#_9f8azrtnp6p5) ***5***

Thishelps students locate and analyze information from the article. Students should use their own words and not copy entire sentences from the article. Encourage the use of bullet points.

[***Answers***](#_djipzn7z1r1b) ***6***

Access the answers to reading comprehension questions and a rubric to assess the graphic organizer.

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Here you will find additional labs, simulations, lessons, and project ideas that you can use with your students alongside this article.

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# Anticipation Guide

**Directions: *Before reading the article*,** in the first column, write “A” or “D,” indicating your **A**greement or **D**isagreement with each statement. Complete the activity in the box.

As you read, compare your opinions with information from the article. In the space under each statement, cite information from the article that supports or refutes your original ideas.

| **Me** | **Text** | **Statement** |
| --- | --- | --- |
|  |  | 1. Intramolecular forces in glitter cause it to stick to almost everything. |
|  |  | 2. Uneven distribution of charges causes intermolecular forces between molecules. |
|  |  | 3. Glitter has three layers. |
|  |  | 4. Most glitter is the same thickness (1mm). |
|  |  | 5. Cosmetic glitter is thicker than craft glitter. |
|  |  | 6. Forensic scientists can link glitter to crime scenes because each manufacturer uses a unique process. |
|  |  | 7. Most conventional glitter is made from mylar. |
|  |  | 8. Biodegradable glitter is made from cellulose. |
|  |  | 9. Biodegradable glitter displays different colors because of dyes that are used in its manufacture. |
|  |  | 10. Biodegradable glitter is safe to eat. |

# Student ReadingComprehension Questions

**Directions**: Use the article to answer the questions below.

1. Which intermolecular forces cause glitter to stick to objects?
2. What are microplastics?
3. Which edible polymer can be used to make edible glitter?
4. List the components used to make glitter.
5. What does PET stand for?
6. What is cellulose?
7. Explain at least two characteristics of glitter that make it ideal contact trace evidence.
8. Why can glitter be considered a microplastic?
9. Explain how the size and weight of glitter particles impact their ability to stick to objects.

**Student Reading Comprehension Questions, cont.**

**Questions for Further Learning**

***Write your answers on another piece of paper if needed.***

1. Draw a diagram or write a paragraph to explain how glitter from cosmetics might end up in our seafood.
2. Provide at least two drawbacks of nanocellulose-based glitter.
3. Explain how temporary regions of partial positive and partial negative charges occur in glitter.
4. Select one of the five facts about glitter (glitter is sticky, glitter production, components of biodegradable glitter, biodegradable glitter’s impact on the environment, edible glitter) and create an infographic to summarize the information.
5. The article describes PET-based glitter as a source of microplastic pollution. Should PET-based glitter be banned? Write a paragraph to explain your response.

# Graphic Organizer

**Directions**: As you read, complete the graphic organizer below to compare the different types of glitter.

|  | **Conventional glitter** | **Biodegradable glitter** |
| --- | --- | --- |
| **How it is made** |   |  |
| **Why it is so sticky** |   |  |
| **Chemicals used** |   |  |
| **How colors are produced** |   |  |
| **Impact on environment** |  |  |

**Summary:** On the back of this sheet, write a short summary (20 words or less) of the article.

# Answers to Reading Comprehension Questions & Graphic Organizer Rubric

1. Which intermolecular forces cause glitter to stick to objects?
London dispersion forces cause glitter to stick to objects.
2. What are microplastics?
Microplastics are tiny pieces of plastic.
3. Which edible polymer can be used to make edible glitter?
The edible polymer that can be used to make glitter is gelatin.
4. List the components used to make glitter.
Glitter is made of PET coated with aluminum, color, and a transparent sealant.
5. What does PET stand for?
PET stands for polyethylene terephthalate.
6. What is cellulose?
Cellulose is a plant polymer.
7. Explain at least two characteristics of glitter that make it ideal contact trace evidence.
Glitter is ideal contact trace evidence because it is sticky, difficult to clean up, and can be traced back to its manufacturer.
8. Why can glitter be considered microplastic?
PET-based glitter contains plastic and is very small, so it is considered microplastic.
9. Explain how the size and weight of glitter particles impact their ability to stick to objects.
Glitter particles are small in size and weight, so they require low amounts of energy to make the particles stick.
10. Draw a diagram or write a paragraph to explain how glitter from cosmetics might end up in our seafood.

Glitter from cosmetics may enter waterways through wastewater streams when it is washed off. The glitter then moves through the wastewater system and into the ocean or a freshwater source. Once it is in open water, the glitter may be consumed by fish. The fish may then be consumed by people.

1. Provide at least two drawbacks of nanocellulose-based glitter.
Nanocellulose-based glitter takes thousands of years to break down and can lead to the growth of unwanted species in an environment.
2. Explain how temporary regions of partial positive and partial negative charges occur in glitter.
Temporary regions of partial positive and partial negative charges occur in glitter when molecules move causing their electrons to become unevenly distributed, creating temporary regions of partial positive and partial negative charges.
3. Select one of the five facts about glitter (glitter is sticky, glitter production, components of biodegradable glitter, biodegradable glitter’s impact on the environment, edible glitter) and create an infographic to summarize the information.
Student responses will vary and should include information from the article.
4. The article describes PET-based glitter as a source of microplastic pollution. Should PET-based glitter be banned? Write a paragraph to explain your response.
Student responses will vary and should include reasoning related to microplastics.

**Graphic Organizer Rubric**

If you use the Graphic Organizer to evaluate student performance, you may want to develop a grading rubric such as the one below.

| **Score** | **Description** | **Evidence** |
| --- | --- | --- |
| 4 | Excellent | Complete; details provided; demonstrates deep understanding. |
| 3 | Good | Complete; few details provided; demonstrates some understanding. |
| 2 | Fair | Incomplete; few details provided; some misconceptions evident. |
| 1 | Poor | Very incomplete; no details provided; many misconceptions evident. |
| 0 | Not acceptable | So incomplete that no judgment can be made about student understanding |

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# Additional Resources and Teaching Strategies

**Additional Resources**

* **Simulations**
	+ [Molecular Polarity](https://phet.colorado.edu/en/simulations/molecule-polarity) – Students can use this PhET simulation to explore electronegativity.

* **Lessons and lesson plans**
	+ [Simulation Activity: Comparing Attractive Forces](https://teachchemistry.org/classroom-resources/simulation-activity-intermolecular-forces) – This AACT lesson plan is designed to guide students through a simulation where they investigate different types of intermolecular forces, including London dispersion forces.
	+ [The Plastisphere: Plastic Migration and Its Impacts](https://www.teachengineering.org/lessons/view/uok-2116-plastisphere-microplastics-pollution-wastewater-treatment) - This lesson plan introduces the concept of microplastics as students examine the ways that microplastics enter waterways and the difficulty of removing them.
* **Projects and extension activities**
	+ [Identifying Plastics with Density Data](https://teachchemistry.org/classroom-resources/identifying-plastics-with-density-data) – This activity helps students learn more about how density can be used to identify types of plastic, including PET.

**Teaching Strategies**

Consider the following tips and strategies for incorporating this article into your classroom:

* **Alternative to Anticipation Guide:** Before reading, ask students if they use glitter, and where they might use it. Also ask students if they know what glitter is made from, and why it is not good for the environment. Ask if they know of any alternatives to glitter. Their initial ideas can be collected electronically via Jamboard, Padlet, or similar technology.
	+ As they read, students can find information to confirm or refute their original ideas.
	+ After they read, ask students what they learned about glitter. Also ask them how glitter impacts the environment.
* After reading, ask students how they might use information from the article to make decisions about using glitter in crafts and cosmetics in the future.

# Chemistry Concepts and Standards

**Connections to Chemistry Concepts**

The following chemistry concepts are highlighted in this article:

* Intermolecular forces
* Polymers

**Correlations to Next Generation Science Standards**

This article relates to the following performance expectations and dimensions of the NGSS:

**HS-PS1-3.** Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

**HS-ETS1-3.** Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

**Disciplinary Core Ideas:**

* PS.1.A: Structure and Properties of Matter
* ETS1.C: Optimizing the Design Solution

**Crosscutting Concepts:**

* Cause and effect
* Structure and Function

**Science and Engineering Practices:**

* Constructing explanations (for science) and designing solutions (for engineering)

**Nature of Science:**

* Science addresses questions about the natural and material world.

See how *ChemMatters* correlates to the[**Common Core State Standards** online](https://www.acs.org/content/acs/en/education/resources/highschool/chemmatters/teachers-guide.html).