

International Journey Spaceflight Experiments Program - IJSEP



Experiments in space are exciting — and working with biological materials makes them even more interesting! But to design a safe and successful experiment for the **International Journey Spaceflight Experiments Program (IJSEP)**, there are some important things you need to know.

This guide explains how to **store, activate, and preserve biological samples** for your IJSEP experiment.

1. Understanding the Mission Timeline

Your experiment will travel from your school to Space - Microgravity environment and back.

Here's what happens:



- **Launch preparation and transport: about 3 weeks.**
- **Experiment time in orbit: 4–6 weeks.**
- **Return to Earth: 1–3 days**, plus extra time for shipping back to your team.

Because this whole trip takes several weeks, **living organisms can't stay active the entire time** — they would use all their nutrients and die before reaching space.

2. Use Dormant (Inactive) Forms of Organisms

It's best to use biological samples that can “sleep” until the right moment.

Examples:



- **Seeds** that start growing only after water is added.
- **Bacteria spores or dried microorganisms** that “wake up” when nutrients or water are added.
- **Freeze-dried (lyophilized) cells or tissues**, which can be rehydrated later.

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💡 How to design your experiment:

Example of how you can load your FME tube:

- **Compartment A:** the dry or dormant sample.
- **Compartment B:** the activating solution (like water or nutrient medium).
When the astronaut opens the clamp, the two mix and the experiment begins!
- **Compartment C:** a fixative / preservative / stabilizer solution.

If you need help choosing the best dormant form, activator or fixative, talk to a **local university or research lab**. Scientists can guide you safely.

🧴 3. Stopping or Preserving the Experiment

Before returning to Earth, you may need to **stop or slow down** your biological experiment to keep results stable.

You can do this by adding either:

- **Fixatives** – chemicals that kill and preserve cells, keeping them close to their natural shape.
- **Growth inhibitors** – substances (often antibiotics) that stop cell growth without killing the sample.
- **Stabilizers** – protective compounds (such as *trehalose*) that help preserve proteins and other biomolecules by preventing damage during drying, freezing, or transport.

Examples:

Purpose	Type	Example
Preserve structure	Fixative	10% Neutral Buffered Formalin (contains formaldehyde)
Preserve RNA	Fixative	RNAlater (non-toxic)
Stop bacterial growth	Inhibitor	Rifampicin + Cephalexin
Stop cell growth	Inhibitor	Puromycin
Preserve proteins and biomolecules	Stabilizer	Trehalose (protects proteins, enzymes, and vesicles during drying or freezing)

⚠️ Fixatives can be **toxic or hazardous**. Teams must handle them carefully and may need help from a local lab. Growth inhibitors are usually safer but still need caution.

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4. Important Safety Rules

IJSEP follows strict safety standards for all experiments.

You **cannot** use materials that are:

- Radioactive
- Perfumes or strong odors
- Hydrofluoric acid, acetone, or other dangerous solvents
- Magnetic materials, beryllium, or cadmium
- Biological samples with **Biosafety Level 2 or higher** (only non-pathogenic samples are allowed)
- Anything that produces **excess heat, gas, or pressure** when mixed

→ See the document “IJSEP Experiment Guide: Materials That Cannot Be Used in Experiments” for the complete list of prohibited materials.

 Check your materials with the **IJSEP Science Team** before finalizing your proposal.

5. Work with Local Scientists

Partnering with a local research lab or university is a great idea!

Scientists can help you:

- **Choose** the right biological sample and how to keep it dormant
- **Find** the best activating solution
- **Select** safe fixatives or inhibitors
- **Design** how to analyze the results after the experiment returns

Even better — many labs already have these materials, so you won’t need to buy them.

6. If You Need to Buy Materials

Some trusted vendors that provide biological materials for educational or research use are:

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INTERNATIONAL
SCHOOL



STEMMED



- [Sigma-Aldrich / Merck](#)
- [Thermo Fisher Scientific](#)
- [Lonza](#)
- [Nova Analítica](#)
- [Êxodo Científica](#)
- [Synth](#)

Note: Some companies only sell to research institutions, not schools - another reason to collaborate with a local lab!



7. Writing About Biologicals in Your IJSEP Proposal

When describing your experiment, make sure to explain:

1. **How you will store your samples** before launch (e.g., dormant form).
2. **How you will activate** them in space (e.g., adding water or nutrients).
3. **How you will stop or preserve** the experiment before return (e.g., fixative, inhibitor or stabilizer).
4. **How you will analyze** the results on Earth.



It's a good idea to test small versions of your experiment on Earth before submission — that's exactly what real scientists do!



8. Final Tips

- Choose safe, non-toxic materials.
- Use small, contained samples.
- Think carefully about timing (activation and preservation).
- Ask for expert help when needed.

Remember: **IJSEP experiments are student-led** — teachers and scientists can guide you, but you are the scientists in charge!