

## Bacteria of BSL-1 (Biosafety-1) – TTS rules included

### Overview of all Bacteria in Mind:

| Organism                        | Opt.Growth temp | Temp Tolerance | UV Resistance | Features                                |
|---------------------------------|-----------------|----------------|---------------|---|
| Synechococcus elongatus (cyano) | 30 Celsius      | 20-35 Celsius  | Moderate      | Photosynthetic, used in various studies |
| Anabaena sp.                    | 25-30 Celsius   | 15-35 Celsius  | High          | Flexible structure                      |
| Spirulina                       | 30-35 Celsius   | 20-40 Celsius  | Moderate      | Many proteins and pigments              |
| E Coli                          | 37 Celsius      | 20-45 Celsius  | Low           | Common lab bacteria                     |
| Bacillus subtilis               | 30-37 Celsius   | 10-50 Celsius  | High          | Resistant to extreme conditions         |
| Saccharomyces cerevisiae        | 30 Celsius      | 10-40 Celsius  | Low           | Bakers yeast                            |

Synechococcus elongatus: \$474 – Supplier ATCC

Anabaena sp: Price Varies – Supplier DSMZ

Spirulina: 10 – 30 (Euro) – Health Food Stores

E Coli: \$150-\$250 - ATCC

Bacillus subtilis: 100 Euro - DSMZ

Saccharomyces cerevisiae: 20-60 (Euro) – Carolina Biological

## Airport Regulations

- Clearly label the outer packaging with "Non-Infectious Biological Substance."
- Include contact information and any pertinent details about the contents.
- Place the bacterial culture in a leak-proof, sealed container.
- Another leak-proof container enclosing the primary receptacle.
- Rigid packaging with at least one surface measuring 100 mm x 100 mm (through Austrian POST [https://assets.post.at/-/media/Dokumente/En/Aufgabelisten-Produktblaetter-Folder/Folder-Hazardous-goods.pdf?rev=1bf76c6d-d750-48d2-857b-5d505abbb039&.com](https://assets.post.at/-/media/Dokumente/En/Aufgabelisten-Produktblaetter-Folder/Folder-Hazardous-goods.pdf?rev=1bf76c6d-d750-48d2-857b-5d505abbb039&.com;); )
- Airport Luggage: Liquids are restricted to containers of 100 ml or less, placed in a transparent, resealable plastic bag. Medical products exceeding 100 ml may be allowed if required during the journey but are subject to additional checks .
- Documentation: Carry all relevant documentation, including Material Safety Data Sheets (MSDS), permits, and a detailed description of the samples.

The mentioned bacillus subtilis is the best bacteria because it is the most affordable (\$20-\$50). The Data Quality of it is also known to be a great choice for researchers and scientists.

The Bacillus pumilus SAFR-032 is also a very good choice because it is similarly affordable (\$20-\$60 depending on supplier) and the data quality is preferred by some Nasa missions.

Both Bacillus subtilis and Bacillus pumilus are well-suited for high-altitude balloon experiments, offering reliable, reproducible data. They are widely available at a low cost and have demonstrated resilience to extreme conditions, making them ideal for budget and experimental needs.

Encapsulation is not needed but it is recommended to improve successful data collection.

Airport Regulation: <https://www.tsa.gov/travel/security-screening/whatcanibring/items/biological-specimens-non-infectious-preservative?.com>

Sources (Prices): <https://trafalgarscientific.co.uk/bacillus-subtilis-atcc6633-in-vials-pk-10/>; <https://www.atcc.org/products/33912>; <https://www.atcc.org/products/9524>; <https://www.atcc.org/products/35021>; <https://www.atcc.org/products/33677>; <https://www.fishersci.com/shop/products/i-bacillus-subtilis-i-subsp-subtilis-atcc-6051-microbiologics/p-4395200>; <https://www.fishersci.com/shop/products/i-bacillus-subtilis-i-atcc-19659-microbiologics/23016251>; <https://webshop.dsmz.de/en/bacteria/Bacillus-subtilis-oxid-60.html>; <https://webshop.dsmz.de/en/bacteria/Bacillus-subtilis-oxid-14.html>; <https://webshop.dsmz.de/en/bacteria/Bacillus-subtilis-oxid-80.html>;

[bacillus-subtilis-nctc-10400-atcc-6633-25;](#)  
<https://www.fishersci.at/shop/products/quant-i-cult-bacillus-subtilis-atcc-6633/12677689;>

Sources (Bacteria Behaviour):

[https://pubmed.ncbi.nlm.nih.gov/38869294/;](https://pubmed.ncbi.nlm.nih.gov/38869294/)  
[https://pubmed.ncbi.nlm.nih.gov/30266724/;](https://pubmed.ncbi.nlm.nih.gov/30266724/)  
[https://pubmed.ncbi.nlm.nih.gov/12583913/;](https://pubmed.ncbi.nlm.nih.gov/12583913/)  
[https://pmc.ncbi.nlm.nih.gov/articles/PMC6238051/?utm\\_source=chatgpt.com;](https://pmc.ncbi.nlm.nih.gov/articles/PMC6238051/?utm_source=chatgpt.com) [https://pubmed.ncbi.nlm.nih.gov/30266724/;](https://pubmed.ncbi.nlm.nih.gov/30266724/)  
[https://pubmed.ncbi.nlm.nih.gov/12583913/;](https://pubmed.ncbi.nlm.nih.gov/12583913/) #

other: [https://oup.silverchair-cdn.com/oup/backfile/Content\\_public/Journal/ismej/13/11/10.1038\\_s41396-019-0474-0/2/m\\_41396\\_2019\\_474\\_fig2\\_html.jpeg?Expires=1746405960&Signature=l7psaHOG29nXjTUSHF5zfqqnwEH~qcfp8Zl5HjX9FEuF3ehGgKRrDnG9p6ftj0hB24iToJGvBBFoiF70FDI7mJwoCmrKxglUo48B-6QFkDYKYdV2Eb03yc6WAJPlNnJ4huinqcbH8lsmVMYAzU~X7S5RLOTfGc5uslsRnDSb8e~Aqh5egHP92nktmHTdEdwiPhN3v8q3wM8XW25smBHhWkpyKENXW7zxY0ihTjherqQADwiDRK9DP04XNQPLYHlDW8yfXR9Clv~Z2X9ctm58yq3TA-cawsVqbRNQXxVwOkUdkeFuzbqdaQeKn2JGYwNuoOhZAbdUOqk6VMB5eRq78g\\_\\_&Key-Pair-Id=APKAIE5G5CRDK6RD3PGA;](https://oup.silverchair-cdn.com/oup/backfile/Content_public/Journal/ismej/13/11/10.1038_s41396-019-0474-0/2/m_41396_2019_474_fig2_html.jpeg?Expires=1746405960&Signature=l7psaHOG29nXjTUSHF5zfqqnwEH~qcfp8Zl5HjX9FEuF3ehGgKRrDnG9p6ftj0hB24iToJGvBBFoiF70FDI7mJwoCmrKxglUo48B-6QFkDYKYdV2Eb03yc6WAJPlNnJ4huinqcbH8lsmVMYAzU~X7S5RLOTfGc5uslsRnDSb8e~Aqh5egHP92nktmHTdEdwiPhN3v8q3wM8XW25smBHhWkpyKENXW7zxY0ihTjherqQADwiDRK9DP04XNQPLYHlDW8yfXR9Clv~Z2X9ctm58yq3TA-cawsVqbRNQXxVwOkUdkeFuzbqdaQeKn2JGYwNuoOhZAbdUOqk6VMB5eRq78g__&Key-Pair-Id=APKAIE5G5CRDK6RD3PGA;)  
[https://academic.oup.com/ismej/article/13/11/2789/7475148#435494011;](https://academic.oup.com/ismej/article/13/11/2789/7475148#435494011)  
[https://www.researchgate.net/publication/281292975/figure/fig1/AS:614174942060546@1523442125296/Conditions-observed-during-the-flight-of-the-stratospheric-probe-in-the-stratosphere-A.png;](https://www.researchgate.net/publication/281292975/figure/fig1/AS:614174942060546@1523442125296/Conditions-observed-during-the-flight-of-the-stratospheric-probe-in-the-stratosphere-A.png) <https://www.researchgate.net/figure/Biochemical->

properties-of-tested-G-bacterial-strains-A-E-coli-B-P-mirabilis-  
C\_fig4\_281292975;