

# Reducing single-use laboratory plastics

A condensed guidance list for University of Bristol research and teaching laboratories.

## Background and description

The University of Bristol is a leading research-intensive university. Laboratories are an integral part of the continued excellence of the University's research, but they can also be a large source of single-use plastic waste. We are working to support laboratories to be as sustainable as possible, and to better understand the use, recycling, and disposal of plastic items in lab settings.

## Guidance

Recommendations to reduce plastic waste and increase alternatives to single-use.

| Recommendation   | Comments  |
|--|---|
| <b><u>Substitute single-use plastic for glass.</u></b><br>Substitutions which have been found effective are: <ul style="list-style-type: none"><li>• Falcon tubes</li><li>• Pipettes</li><li>• Filter bottles</li><li>• Petri dishes</li><li>• Bijou bottles</li><li>• Test tubes</li><li>• Replace plastic weigh boats with watch glass</li></ul>   | Washing and autoclave capabilities are necessary for sterile procedure. Baskets or boxes recommended for storage and autoclaving.   |
| <b><u>Substitute single-use plastic for other reusable materials, or reuse current single-use items.</u></b><br>Substitutions which have been found effective are: <ul style="list-style-type: none"><li>• Reuse pipettes and pipette tips when aliquoting</li><li>• Reuse weigh boats</li><li>• Reuse gloves (decontaminate with ethanol)</li><li>• Substitute plastic pipette tips with metal ones</li><li>• Reuse tubes and cuvettes (with a rinse between)</li><li>• Reuse beaker or tip-collecting container, rather than single-use 'dispo jars'</li></ul> | Reusable items can have comparable performance to single-use items, even in sterile procedures. However, if there is concern, consider starting these substitutions in situations where sterile procedure is not necessary, such as bench work. |
| <b><u>Reduce packaging plastics.</u></b><br>Suggested ways to reduce are: <ul style="list-style-type: none"><li>• Purchase bagged falcons and reuse original racks</li><li>• Reuse pipette tip boxes and refill with bulk tips</li><li>• Reduce the number of suppliers, thereby reducing number of deliveries</li><li>• Only purchase single-packaged stripettes when specifically necessary</li></ul>  |   |
| <b><u>Increase laboratory plastic recycling.</u></b><br>Uncontaminated packaging can be recycled for which caddies are available.<br><a href="https://www.bristol.ac.uk/green/get-involved/green-labs/resources/">https://www.bristol.ac.uk/green/get-involved/green-labs/resources/</a> .   | Many buildings and schools have collection points for lab items (particularly gloves and tip boxes). Identify the closest or coordinate a new one via the Green Labs Team.  |

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Commonly accepted items:

- Tip boxes
- Non-contaminated media bottles
- Non-contaminated solvent bottles

Items accepted in specific locations:

- Non-contaminated gloves

**Consider implementing a further recycling scheme:**

- Non-contaminated gloves
- Collection points for packaging take-back schemes from suppliers
- Create a decontamination station for recyclable plastics (contact [green-labs@bristol.ac.uk](mailto:green-labs@bristol.ac.uk))

Ensure your decontamination process is appropriate for the materials you work with.

Example decontamination process: 16-hour soak in a high-level disinfectant followed by a rinse for chemical decontamination.

**Plan experiments to reduce single-use plastic.**

Some effective examples include:

- Calculate minimum tubes/plates required
- Prepare bulk master mix to reduce tips and tubes
- Use the smallest container possible for aliquots, tubes, bottles
- Prepare culture media in bulk
- Reduce aliquot numbers and procedure steps
- Refill solutions rather than using new bottles

**Where possible, share common items to reduce ordering.**

Some examples include:

- Building-wide sharing programmes for reagents and consumables

**Utilise bottle top dispensers.**

This can reduce tips, pipettes, and other intermediary containers.

**Reduce plastic used for labelling.**

Some methods include:

- Wipe labels with ethanol and reuse
- Cut labels in half

**When plastic is unavoidable, use recycled sources rather than virgin plastic.**

Some substitutions include:

- Reaction tubes

**Make changes in teaching labs where sterile procedure is not as high priority.**

Suggestions include:

- Use multi-media aids, such as having students load a sample then use a video to model the gel
- Refill solutions between practicals, rather than using a new bottle
- Use bottle top dispensers for measuring
- Reuse gloves
- Reuse weigh boats

- Reuse tubes and cuvettes with a rinse between
- Use paper cups, wooden coffee stirrs, wooden swabs, wooden toothpicks in place of plastic items

**If reliant on bottled ultra-pure water, consider replacing with an in house system**

## References

1. University College London Case Study: comments from Saiardi Lab on effective plastic-reducing measures for in cell biology / molecular biology.
2. University of York article: <https://www.york.ac.uk/news-and-events/news/2019/research/one-planet-week-waste-plastic-from-labs/>
3. EACR blog: <http://magazine.eacr.org/a-few-key-ways-to-reduce-plastic-waste-in-the-lab/>
4. University of York case study, article with comments on effective implementation of lab plastics recycling: <https://thebiologist.rsb.org.uk/biologist/158-biologist/features/2072-how-to-reduce-your-lab-s-plastic-waste>
5. Article on reducing plastic waste: <https://www.the-scientist.com/careers/life-scientists-cut-down-on-plastic-waste-64547>
6. Harvard sustainability article: <https://green.harvard.edu/news/plastic-glassware-conversions-hscrb-saves-money-reduces-waste>
7. Penn reusable petri dish pilot article : <https://www.sustainability.upenn.edu/get-involved/green-fund/reusable-petri-dish-pilot-0>
8. Bite size bio article: <https://bitesizebio.com/25950/reducing-lab-waste-one-experiment-at-a-time/>
9. University of Westminster guidance : [http://2018.igem.org/wiki/images/a/aa/T--Westminster\\_UK--chemJen.pdf](http://2018.igem.org/wiki/images/a/aa/T--Westminster_UK--chemJen.pdf)
10. Environment Journal article: <https://environmentjournal.online/articles/how-scientists-are-recycling-tonnes-of-plastic-waste-from-labs/>
11. Radley's article: <https://www.radleys.com/news-events/blog/blog/2018/04/17/how-to-use-plastic-more-sustainably-in-the-lab>
12. Elga article: <https://www.elgalabwater.com/cutting-back-laboratory-plastic-waste>
13. University of York article: <https://www.york.ac.uk/news-and-events/news/2019/research/one-planet-week-waste-plastic-from-labs/>

## Further resources

- BLOG: <https://edinburghcrf.wordpress.com/2017/09/14/improving-recycling-in-the-laboratory-challenges-to-be-overcome/>
- Glove recycling: <https://www.ed.ac.uk/about/sustainability/what-we-do/circular-economy/case-studies/glove-recycling>
- University of York case study, article with comments on effective implementation of lab plastics recycling: <https://thebiologist.rsb.org.uk/biologist/158-biologist/features/2072-how-to-reduce-your-lab-s-plastic-waste>