

Reducing single-use laboratory plastics

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

Background and description

The University of Edinburgh is a leading research-intensive university, with more than 80% of our research activity considered world leading or internationally excellent. 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
<p><u>Substitute single-use plastic for glass.</u> Substitutions which have been found effective are:</p> <ul style="list-style-type: none">• Falcon tubes• Pipettes• Filter bottles• Petri dishes• Bijou bottles• Test tubes• Replace plastic weigh boats with watch glass	<p>Washing and autoclave capabilities are necessary for sterile procedure. Baskets or boxes recommended for storage and autoclaving.</p>
<p><u>Substitute single-use plastic for other reusable materials, or reuse current single-use items.</u> Substitutions which have been found effective are:</p> <ul style="list-style-type: none">• Reuse pipettes and pipette tips when aliquoting• Reuse weigh boats• Reuse gloves (decontaminate with ethanol)• Substitute plastic pipette tips with metal ones• Reuse tubes and cuvettes (with a rinse between)• Reuse beaker or tip-collecting container, rather than single-use 'dispo jars'	<p>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.</p>
<p><u>Reduce packaging plastics.</u> Suggested ways to reduce are:</p> <ul style="list-style-type: none">• Purchase bagged falcons and reuse original racks• Reuse pipette tip boxes and refill with bulk tips• Reduce the number of suppliers, thereby reducing number of deliveries• Only purchase single-packaged stripettes when specifically necessary	
<p><u>Increase laboratory plastic recycling.</u> <i>NOTE (October 2019) To be updated. – Discussions are ongoing with our waste contractor about this, so this action cannot be taken immediately, but see below for future actions.</i></p>	<p>Many buildings and schools have collection points for lab items (particularly gloves and tip boxes). Identify the closest or coordinate a new one.</p>

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 (*see note above about discussions with waste contractor*)

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

Example decontamination process: 24-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
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>