Reducing Consumable Use

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1. Purpose

This document provides information about the use of consumables in laboratories and acts as a guide to provide tips on how laboratories can take steps to reduce this use. The reduction of consumables will help laboratories who are aiming for the LEAF silver and gold award. This document also supports the University to achieve objectives set out in the Environmental Policy and maintain compliance with the ISO 14001:2015 environmental management system.

2. Scope

This document is relevant to all laboratory users.

3. Procedure

Laboratory plastics account for 2% of the of the total plastic waste generated globally each year, in 2015 a *Nature* article was published that estimated that academic research laboratories produce 5.5 million tons of plastic waste each year.

A study has been done that concludes that the re-use of glass and plasticware reduces CO2 emissions and costs compared to using single use plastics. More information can be found here.

We also need to consider the amount of waste that is sent out as clinical waste. Clinical waste can cost 5-10 times more to dispose of than normal waste and the incineration process is very energy intensive.

When it comes to consumable use focus on these 6R's:

- **Refuse**
  - Ask suppliers for Life cycle assessments.
  - Refuse unsustainable products.
  - Share resources and buy only what you need.
  - If possible consolidate orders with other laboratory users.
- **Reduce**
  - Optimise experimental design to lower consumable use.
  - Use smallest plastic vessel feasible.
  - Replace single use plastics with reusable alternatives.
  - Use refill systems.
- **Reuse**
  - Wash and reuse plastics if possible.
  - Reuse or send packaging back to suppliers.
- **Repurpose**
  - Repurpose empty plastic containers to hold waste.
- **Recycle**
  - Recycle what you can in the laboratory.
  - Make use of supplier take back and recycling schemes.
- **Replace**
  - Replace the use of plastics with glass, paper or wood.

The following offers some guidance on changes that can be made in the laboratory to reduce the use of consumables:

3.1 Tubes

Plan your experiment and think about the size of tube you need. Aswell as 1.5ml, 2ml, 15ml and 50ml companies now offer 5ml and 25ml tubes to act as in-between sizes. Use the smallest tube possible for the volume you need.

3.2 Tips

Instead of buying standard tips keep the boxes and order refill racks, these refill racks use up to 63% less plastic than the standard racked system. Consider the use of bagged tips if possible.

3.3 Reservoirs

For most applications reservoirs can be washed and reused. Companies offer reusable reservoirs instead of disposable ones. Label the reservoir with the reagent it's used for and reuse for the same reagent.

3.4 Gloves

Although safety in the lab is paramount not all lab operations require the use of gloves. Think about what you are doing in the labs and are gloves necessary.

3.5 Glass bottles

Offer a variety of sizes of glass bottles for making up solutions. Does the solution you are making need to be sterile? If not and you only need a small amount use a glass bottle instead of a plastic tube. Glass bottles can also be autoclaved before use if a sterile container is required, if the autoclave is being used for a run fill any space with glass bottles. Remember autoclaving is very energy intensive so only run the autoclave when it is full.

3.6 PCR

When running a PCR think if a plate is required, if you are not running a full plate then use strips instead.

3.7 Serological pipettes

If possible, replace plastic serological pipettes with glass or use a measuring cylinder instead. If this is not possible think can the serological pipette be used multiple times rather than using a new one each time. If the same solution is being used multiple times during an experiment then place the serological pipette back in the packaging for re use.

3.8 Media bottles

Once a media bottle is empty, reuse this bottle for waste tips and tubes rather than using a new disposafe jar.

3.9 Tip boxes

Instead of sending empty tip boxes for recycling consider re-using them. Tip boxes can be used for storage of samples and the racks from the 10ul and 20ul boxes can be used for holding PCR tubes instead of purchasing PCR tube racks.

3.10 Plastic bags

Consumables such as loose pipette tips come in plastic bags. Instead of throwing these away can then be reused for storing items or in shipments.

3.11 Tissue Culture

Flasks and plates can be re-used, consider the implications to the experiment before re-using flasks but if cells are being passaged for growing up then consider re-using the parent flask instead of using a new flask. Think about the culture media you are using and how much you require, if possible prepare culture media in bulk.

3.12 Weigh Boats

If possible when weighing chemicals weigh them into the container being used to make up the chemical. If this is not possible then instead of using disposable weigh boats consider the use of watch glasses to weigh out non-hazardous chemicals, these can be washed and reused. Or for hazardous chemicals use paper cup cases.

3.13 Disposafe jars

Replace the use of plastic disposafe jars with bio-bins. Bio-bins are available in sizes from 1L to 30L and are 96% paper so will reduce the amount of plastic going out for waste.

3.14 Plastic loops and spreaders

For microbiology where possible instead of using disposable plastic loops and spreaders use metal loops and spreaders that can be sterilised using the Bunsen burner between each use. If replacing with metal is not possible consider using wooden tooth picks to pick colonies

3.15 Master mix

Preparing bulk master mixes can reduce the number of tips and tubes used.

3.16 Waste and Recycling

Recycle as much as you can in the laboratory, the following items can be recycled if they do not become contaminated:

- Packaging from deliveries – cardboard or paper into recycling, Styrofoam, bubble wrap or cushioning into general waste.
- Paper backing from serological pipettes can be removed and recycled.
- Paper backing from Qiagen columns can be removed and recycled.
- Non-hazardous, non-Pyrex glass that have been vented and washed.
- Straw and wool packaging

3.17 Supplier take back and recycling schemes

These include but are not limited to:

- Tip box recycling – offered by most companies, if not available contact laboratory sustainability officer.
- Supplier packaging return – Promega and NEB offer free returns of their shipping boxes.
- 2.5L Glass Winchesters and 2.5L Plastic Mauster bottles from fisher.
- Flow cells from Oxford Nanopore Technologies.
- Water purification cartridges from Elga
- Ice packs – contact laboratory sustainability officer
- KimTech PPE recycling – at cost.
- Zero waste box – Fisher and VWR – at cost.
- AppCycle box from Appleton woods – at cost.

4. Changes to the procedure

Version	Reason for change	Date
1.0		November 2023
2.0	Change to purpose, scope, 3, 3.11, 3.12 and addition of 3.13 – 3.17	January 2024
3.0	Changes to 3.16 and 3.17	December 2025