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# Immobilisation Techniques

Practical 4 - Biological teaching-data practical

## Aim

To evaluate immobilisation of an approved whole-cell or enzyme model.

## Principle

Entrapment or attachment retains biological material in a support while permitting transport of substrate and product. Apparent activity reflects loading, viability or enzyme stability and mass-transfer limitations.

## Materials and Requirements

- Approved nonpathogenic teaching system or supplied anonymised dataset
- Laboratory risk assessment, controls and raw-data worksheet
- Approved method or teaching-data pack and a dated record sheet

## Procedure

1. Define the preparation or dataset, study question and method version. Record identities, units and the criteria to be used before examining the outcome.
2. Choose an approved benign model, defined support and an authorised immobilisation procedure.
3. Record input biomass or activity, support quantities and actual preparation and wash conditions.
4. Measure retained activity, leakage and activity in the wash with appropriate free-system and support blanks.
5. Assess repeated-cycle response and distinguish loss of catalyst from transport or chemical limitations.
6. Retain the original observations and calculations. State deviations, missing information and the limits of the conclusion; do not replace measured values with expected results.

## Observations and Record

Enter actual measurements or the supplied teaching data. Record the method, material identity, conditions and units.

| Preparation / control | Condition / method | Raw observation | Calculated / interpreted result |
|---|---|---|---|
| Negative / vehicle control | Specify | Record | Evaluate |
| Positive / reference control | Specify | Record | Evaluate |
| Test replicates | Specify | Record | Calculate |

## Calculations

- Activity retention (%) = measured immobilised activity / input free-system activity x 100

### Worked Example

Illustrative 100 activity units enter the process and 70 units are recovered in the immobilised preparation: retention = 70%.

Compare assays on a consistent activity basis and account for diffusion effects.

## Result and Interpretation

- Report loading, retained activity, leakage and reuse performance under stated conditions.
- Report biological and technical replication separately and explain control performance.

## Precautions

- Use only the approved biological system, containment and decontamination procedure.
- A teaching dataset does not authorise live animal, human-tissue or unknown-organism work.
- Keep original images and observations; avoid selecting only favourable fields or bands.

## Viva Questions and Answers

### What can limit immobilised activity?

Diffusion and catalyst changes can both reduce apparent activity.

### Why analyse washes?

They reveal nonretained or leaking material.

### Does reuse prove indefinite stability?

Performance is established only for the tested cycles and conditions.

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