SEMLATA3-12
Measuring, weighing and preparing compounds and solutions for laboratory use

Overview

This unit covers the competences you need to measure, weigh and prepare compounds and solutions for laboratory investigations. Prior to undertaking the laboratory activity, and in accordance with approved procedures and practices, you will be required to carry out all the necessary preparations, within the scope of your responsibility. This may include preparing the work area and ensuring that it is in a safe condition to carry out the intended activities, and ensuring that any materials, equipment or other resources required are available and are in a safe and usable condition. You will be required to work to the relevant standard operating procedures, legislation and organisational policy, and to follow Good Laboratory Practice (GLP) and/or Good Clinical Practice (GCP)/Good Manufacturing Practice (GMP). You will also be required to present records and details of your laboratory work to the appropriate people.

On completion of the laboratory activity, you will be required to return your immediate work area to an acceptable condition before undertaking further work. This may involve putting processed paperwork in the correct location, returning and/or storing any materials and equipment in the correct area, identifying any waste and arranging for its disposal, and reporting any defects or damage to the materials and equipment used.

Your responsibilities will require you to comply with organisational policy and procedures for the measuring, weighing and preparations undertaken, and to report any problems with the activities, materials or equipment that you cannot personally resolve or that are outside your permitted authority, to the relevant people. You will work with a minimum of supervision, either on your own or as part of a team, whilst taking responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to measuring, weighing and preparing compounds and solutions in a laboratory environment. You will understand the importance of doing this work efficiently and effectively, and will know what to consider when preparing and tidying up the work area before and after the measuring, weighing and preparation activities. You will also know how to deal with problems, and how to achieve your work objectives and targets, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

You will understand the safety precautions required when carrying out laboratory activities. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

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Performance criteria

You must be able to:

P1 ensure that your work is carried out in accordance with standard operating procedures

P2 wear the appropriate personal protection equipment (PPE) when handling materials

P3 use laboratory scales for accurately weighing out materials, using metric/imperial measures

P4 accurately measure pH and conductivity of solutions in the laboratory, using correctly calibrated meters

P5 measure out aliquots of liquids into tubes and microtrays for laboratory use and analysis

P6 measure liquids and solids for laboratory use and analysis

P7 communicate the required information about the work done, to authorised people, in accordance with departmental and organisational procedures

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Knowledge and understanding

You need to know and understand:

Sector specific

K1 the health and safety requirements of the area in which you are carrying out the laboratory activities

K2 the implications of not taking account of legislation, regulations, standards and guidelines when conducting laboratory activities

K3 the principles of Good Laboratory Practice (GLP) and/or Good Clinical practice (GCP)/Good Manufacturing Practice (GMP) applied in the workplace

You need to know and understand:

Organisation specific

K4 the importance of wearing protective clothing, gloves and eye protection when handling specimens/samples

K5 the importance of correct identification, and any unique organisational or laboratory numbers

K6 the lines of communication and responsibilities in your department, and their links with the rest of the organisation

K7 the limits of your own authority and to whom you should report if you have problems that you cannot resolve

You need to know and understand:

Equipment/Process specific

K8 how to calculate mass/mole calculations in metric and/or imperial measures

K9 how to select the appropriate balance and scale for less than 100mg, 100mg to 5g, and 5g and above

K10 how to check that a pipette is clean, dry, free of chips and ready for use

K11 how to check the calibration on a pipette

K12 how to calibrate and check the calibration on a pH meter

K13 how to calibrate and check the calibration on a balance

K14 how to calibrate and check the calibration on a conductivity meter

K15 how to measure and weigh solids and liquids for laboratory use

K16 how to convert between different units of concentration (such as moles/litre, grams/litre, percent mass per volume and parts per million)

K17 how to calculate dilution factors and dilution volumes to make solutions from concentrated stock solutions

K18 the pH scale as a logarithmic scale for the measurement of the acidity of aqueous solutions, and the importance of pH to biological systems and processes

K19 how to choose the appropriate measuring equipment for the scale, accuracy and precision required for the task

K20 how to clean and maintain the pipettes, balances, pH meter probes and

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conductivity meter probes

Additional Information

Scope/range related to performance criteria

You must be able to:

1. use three of the following types of protective clothing and equipment:
   - 1.1 laboratory coat
   - 1.2 gloves
   - 1.3 other (please specify)
   - 1.4 face mask
   - 1.5 safety glasses
2. carry out weighing activities using balances (scales), using **two** of the following accuracies:
   - 2.1 grams
   - 2.2 milligrams
   - 2.3 micrograms
3. measure out aliquots of solutions, using **four** of the following:
   - 3.1 automated pipettes
   - 3.2 graduated cylinders/beakers/tubes
   - 3.3 volumetric flasks
   - 3.4 graduated/bulb pipettes
   - 3.5 other (please specify)
   - 3.6 syringes
   - 3.7 burettes
4. measure pH and/or conductivity, using **two** of the following:
   - 4.1 handheld pH meter
   - 4.2 combined pH/conductivity meter
   - 4.3 conductivity meter
   - 4.4 bench top pH meter
   - 4.5 other (please specify
5. calibrate or check the calibration for **two** of the following:
   - 5.1 pH meter
   - 5.2 conductivity meter
   - 5.3 other (please specify)
   - 5.4 balance
   - 5.5 pipettes
6. calculate the concentrations of solutions, the amounts and volumes required, using **four** of the following:
   - 6.1 moles per litre
   - 6.2 parts per million
   - 6.3 other (please specify)
   - 6.4 grams per litre
   - 6.5 mass percent
7. make up known volumes of solutions to a specified concentration, using **both** of the following:
   - 7.1 by measuring and dissolving the correct amount of solute in the

correct volume of diluent/solvent

7.2 by dilution from a concentrated stock solution

8. weigh and prepare **three** of the following types of compound or solution:
   - 8.1 powders/granulations that do not readily lose or gain weight (moisture or solvent)
   - 8.2 solids that readily lose or gain weight (moisture or solvent)
   - 8.3 liquid samples (by difference)
   - 8.4 liquid samples (direct)
9. record details of the work, and communicate the details to the appropriate people, using:
   - 9.1 verbal report

   plus **one** method from the following:
   - 9.2 written or typed report (eg, laboratory notebook)
   - 9.3 computer-based record
   - 9.4 specific company documentation
   - 9.5 electronic mail

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