



RADMASTE TEACHING AND LEARNING RESOURCES IN SUPPORT OF THE CAPS – PHYSICAL SCIENCES

The Department of Basic Education has been implementing the Curriculum and Assessment Policy Statement (CAPS) for Grades R – 12 since 2012. At the FET level, the CAPS started in January 2012 with Grade 10. During 2013, the Grade 11 CAPS was implemented. The Grade 12 CAPS is being phased in during 2014 and all matriculants, whether meeting Grade 12 for the first time or repeating matric, will be expected to write the CAPS examinations from 2014 onwards.

In schools where there are little or no resources for practical work and finances to put the Physical Sciences CAPS into action are lacking, teachers and HODs of Physical Sciences may experience panic and apprehension. CAPS activities must be done and Prescribed Practical Activities must count towards the School Based Assessment (SBA) of each Grade 10 to 12 learner.

The RADMASTE Centre has developed a unique teaching and learning tool that offers the best possible combination of microscale and traditional equipment to overcome these problems, as well as meeting all the objectives and purposes of the CAPS for Physical Sciences. **RADMASTE presents.....**

THE PHYSICAL SCIENCES MODULAR PACK FOR CAPS

The Physical Sciences Modular Pack has been designed to address all of the Knowledge Areas of the new CAPS Chemistry and Physics curricula for Grades 10 to 12. RADMASTE has developed this Modular Pack with the aim to make available to schools all the equipment, chemicals and written materials for the Physical Sciences CAPS.

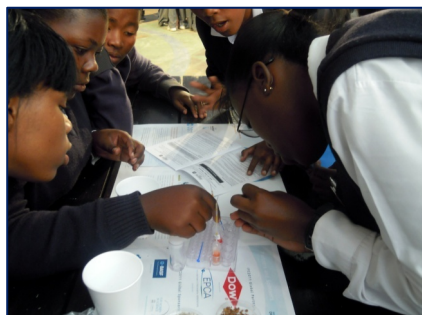
The Physical Sciences Modular Pack consists of the following components:

CORE EQUIPMENT for CHEMISTRY and PHYSICS

A set of core equipment (PSMP10) is needed for all FET grades which will enable learners to carry out the majority of the Prescribed and Recommended Practical Activities for formal and non-formal assessment, as well as selected other practical activities listed in the Physical Sciences CAPS.

This equipment is for a class of 40 to 50 learners working in groups.

The package comprises a clever combination of microscale kits and conventional (macro-) apparatus to ensure maximum coverage of the Physical Sciences syllabi.



The advantages of microscale practical activities in science have been described previously by many educators and scientists in many countries, and locally the GDE Mathematics, Science & Technology Education Improvement Strategy, 2009-2014 advocates this approach. The conventional teacher demonstration kits allow for topics, such as Waves, to be addressed where microscale equipment cannot be used.

For Grades 11 and 12, certain activities require the use of specialised equipment which is described later. These add-on items to the core equipment kit are also low-cost and are only needed for Grades 11 and 12.

The core equipment kit is supplemented with Graded Microchemicals Kits and Graded Teacher Guides to allow maximum coverage of the CAPS Physical Sciences syllabi.

The core equipment kit is described below in more detail:

CORE EQUIPMENT FOR CHEMISTRY

Advanced Microchemistry Kits

There are 10 Advanced Microchemistry Kits which allow for learners working in groups of 4 or 5 to perform Prescribed, Recommended and selected other Practical Chemistry Activities for the Physical Sciences CAPS. Formal and non-formal assessment is therefore possible for all of the CAPS Grade 10 to 12 Chemistry practical work.



Molecular Teaching Kit (MTK)

The Molecular Teaching Kit or MTK contains RADMASTE™ Molecular Stencils for the drawing of several common atoms, ions and molecules. It also contains modelling components to enable 3D visualization of atoms and molecules. The Molecular Teaching Kit therefore addresses all of the molecular modelling activities embodied in the topics of Matter & Materials and Chemical Change.

The kit also caters for learners working in groups of 4 or 5.

Digital Pocket Scale (DPS)

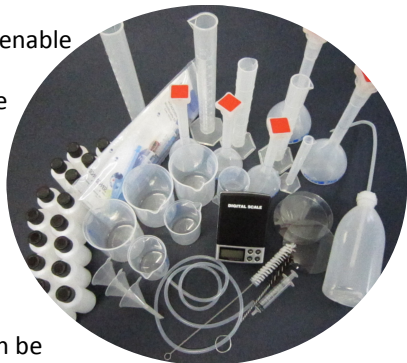
This portable, lightweight balance with accuracy to two decimal places can be used by learners for activities involving Conservation of Mass, and Molecular and Formula Masses. It should also be used by teachers where no weighing apparatus is available for preparing chemical solutions from the stock chemicals in the Chemicals Kit.

Thermometers

The 10 thermometers for group work can read temperature and temperature changes between -10 and 110 °C, which is especially necessary for the Prescribed Practical Activity: Heating and Cooling Curve of Water as well as for measuring temperature during melting point and boiling point determinations.

Chemical Preparation Kit

The Chemical Preparation Kit has been included to enable teachers to prepare all the necessary chemical solutions from the solids and liquids provided in the Physical Sciences Chemicals Kits. This kit takes advantage of the variety of plastic (unbreakable!) resources available for preparing solutions. It is based upon the use of microscale activities, and therefore takes into consideration the need to prepare much smaller volumes of solutions (50 ml, 100 ml). Plastic bottles of 50 ml capacity are also supplied for safe storage of the solutions. These can be washed and re-used.



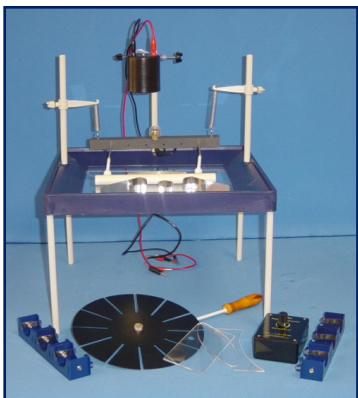
CORE EQUIPMENT FOR PHYSICS

Basic Microelectricity Kits and Multimeters

The RADMASTE™ Basic Microelectricity Kits and digital multimeters will help learners to complete all Prescribed and Recommended Activities for the topic of Electricity and Magnetism. There are also several other CAPS Practical Activities that are covered by this apparatus. Using the microscale kits, learners will encounter circuits and circuit components, such as resistors, cells and bulbs as well as learn about current, voltage and resistance in a much more interactive way than if conventional apparatus were used.



Teacher Demonstration Kits and Power Supply



It is evident that not all Physical Sciences topics can be addressed using microscale equipment. For this purpose, the RADMASTE™ Modular Pack for the Physical Sciences includes two conventional scale teacher demonstration kits, namely:

- ✓ The Forces, Motion and Dynamics (FMD) Demo Kit: contains all resources required for the topic of Mechanics.
- ✓ The Waves, Sound, Light and Optics (WSLO) Demo Kit: includes apparatus for all activities on different kinds of Waves.

The provision of a power supply (AC/DC; 6V and 12V) means that teachers do not have the problem of

replacing expensive batteries for these two demonstration kits.

Specialised Equipment for Selected Grade 11 & 12 Chemistry Activities

In Grades 11 and 12, there are certain activities linked with specific topics that need special equipment not contained in the core equipment kit. For these activities, schools can supplement their core equipment with two additional items:

- ♣ The RADMASTE Microburette Kit
- ♣ The RADMASTE Organic Microchemistry Kit

We recommend that 10 each of these kits is acquired for use with learners working in groups.

CHEMICALS FOR CHEMISTRY ACTIVITIES

All of the CAPS Microchemicals Kits for Grades 10 to 12 include quantities of chemicals that are approximately 10% of those required for activities done on conventional scale. The use of Microchemistry Kits for the CAPS chemistry activities means that much smaller quantities of chemicals will be sufficient for one year of use, and these small quantities will also be much easier and safer to store. The CAPS Microchemicals Kits contain stock chemicals, meaning that teachers need to prepare solutions from solids as well as liquids (such as ethanol) and concentrated solutions (e.g. acids). The Chemical Preparation Kit and DPS mentioned previously are ideal for this purpose. The advantage of supplying stock chemicals is that there will be sufficient supplies available to replace solutions that have been consumed or even contaminated. Practical work is thus sustained instead of being thwarted by the exhaustion of chemical supplies.

RADMASTE CAPS TEACHER GUIDES

RADMASTE has authored Teacher Guides for CAPS Grades 10, 11 and 12. Within these Guides, teachers will find learner activities for all Prescribed (formal assessment) and Recommended (non-formal assessment) CAPS Practical Activities for Chemistry and Physics. These are supported with teacher notes, exemplar answers to questions in the learner worksheets, marking guidelines and assessment tools. Several other selected Grade 10, 11 and 12 CAPS Practical Activities have also been included in the Teacher Guides. These have learner worksheets and some teacher notes. All of the activities in the Teacher Guides make use of the equipment in the Core Equipment Kit (PSMP10), and the chemicals in the graded Microchemicals Kits where chemistry is concerned. For selected Grade 11 and 12 activities, there is a need for the specialised, low-cost equipment mentioned previously.

