Using Learn Chemistry 'Challenging Medicines' Resources

Links to the curriculum

The Challenging Medicines resources can be used as stand-alone resources or combined to provide support for a very wide variety of curriculum topics. They provide a rich bank of information, ideas and instruction sheets relevant to many commonly studied topics in chemistry and biology.

- Individual resources may be used to enrich topics by providing alternatives to traditional experiments in familiar topic areas. These experiments, chosen from the contexts of the preparation of inorganic compounds, analysis, solubility studies, determination of pK_a values, partition coefficients and rates of reaction provide new and different examples that illustrate commonly studied topics in chemistry and biology. Some of these experiments such as solubility, pK_a, partition and rates of reaction investigations lend themselves to more extended study as projects.

- Resources may also be used together to provide greater breadth to the study of medicine related topics. Student experiment sheets, teacher presentations and information sheets are interconnected and used together they can provide a coherent picture of a topic.

- Resources can be used by learners to support independent research or group work when they are given a medicine related task or project to complete. Learners can choose from the interlinked resources to create their own portfolio of work, including their own experiments, in the context of medicine related topics.

- Resources can be used to support cross curricula projects where the distinction between traditional chemistry and biology topics is blurred. This approach can break down barriers between traditional scientific disciplines and allow for a greater flexibility in approach in which medicine related topics are at the centre of study.

- Specific examples of the uses of the Challenging Medicines resources within the curriculum and in enrichment sessions are described below.

Using experiments and investigations

(i) Preparation of inorganic compounds

As an alternative to the preparation of an inorganic salt such as copper(II) sulphate, other inorganic compounds can be prepared that are used as medicines. Examples include sodium bicarbonate which is used as ear drops and milk of magnesia used as a treatment for indigestion.

(ii) Analysing solutions using colorimetric measurements

The resource includes a number of examples of the use of colorimeter or spectrophotometer to analyse coloured solutions in the context of medicines that can be used to extend the

more conventional colorimetric experiments. Examples include finding the concentrations of 2-hydroxysalicylic acid, aspirin and paracetamol.

(iii) Solubility studies

The resource includes experiments to study the dissolution of black current losenges to illustrate the general technique of investigating solubility over time. Other experiments use the same technique to investigate the dissolution of aspirin and paracetamol.

(iv) Determination of pK_a values

A number of experiments in the context of medicines extend the range of study of acids and bases. These include the determination of pK_a values for 2-hydroxybenzoic acid, aspirin and glycine.

(v) Partition and distribution coefficients

Two experiments are described that are relevant to the study of partition and distribution coefficients. These are the determination of the partition coefficient of butanedioic acid and the determination of the distribution coefficient of 2-hydroxybenzoic acid.

(vi) Rates of reaction

To add to more traditional rates of reaction experiments, details are provided about how to measure the rate of hydrolysis of aspirin and the rate of permeation of aspirin and paracetamol.

Use of support material about physiochemical properties

Support materials cover a range of physiochemical properties that affect the efficiency of medicines. Each topic is covered in short engaging sections that link to practical applications in the use of medicines. These mini-studies are particularly suitable for students studying modules of applied science that have a focus on medicines and they provide a wealth of information for individual student study.

Background information is provided about the properties of medicines including dissolution testing, partition and distribution coefficients, ionisation of drug molecules, drugs and acid dissociation constants and how drug activity and physiochemical properties are measured.

Medicines are described in the context of pharmokinetic processes occurring in the body of liberation such as absorption, distribution, metabolism and excretion.

Body chemistry

Information is available in the resource about biological process occurring in the body. These components of the resource provide a clear summary for students who wish to revise the basic biological principles on which the use of medicines is based.

Topics in this section include the digestive, musculo-skelatal, respiratory, cardiovascular, excretory, nervous, endocrine and reproductive systems, the immune and integumentary defence systems, hormones, homeostasis and body chemicals.