

Learning and Teaching Scotland has informed us that they are making resources available on line to support the new Higher science qualifications. Some of the materials have been developed with substantial input from SSERC. We look forward to having a good look at everything on offer when we have appropriate access.

The new CfE-inspired Highers in Biology, Chemistry, Human Biology and Physics will be available for early adoption in Scottish schools from June 2011. Learning and Teaching Scotland (LTS) have commissioned resource writers to produce a wide range of support materials for these new qualifications. These customised support materials will be presented in a variety of engaging, modern formats including scientific animations, short films, Powerpoints, interviews and web-links, as well as a range of more traditional paper-based resources. The materials will be accessed from the National Qualifications website [1]. Latest news of developments may be found on the National Qualifications Sciences blog [2] and resources on the

National Qualifications Sciences Glow Groups [3]. Theoretically, Glow users will be able to access all the Sciences Glow Groups but we, at present, cannot.

## Higher Biology/ Higher Human Biology

The following resources have been produced for both the Biology and Human Biology courses:

- Extensive teacher support notes covering the whole course.
- A wide variety of active learning activities.
- Nine 'case studies' on topical issues. These case-studies are either practical-based or research-based or involve studying first-hand experimental data. An example of a practical case-study on PCR, which was developed with support from SSERC, is already available in the Biology Glow group. Full details may be seen in SSERC Bulletin 233, Autumn 2010 [4]
- An 'Evolution' support pack adapted for the new Higher from an Edinburgh University resource.
- A skills development resource on effective web research in Biology.



Figure 1 - National Qualifications Support at LT Scotland

## Higher Chemistry

- A teacher support pack on the new style 'Open-ended questions'.
- Three topical 'Researching Chemistry' support packs looking at areas such as biodiesel, antioxidants and alcohols. Each support pack consists of a teacher's guide, a technician's guide and a pupil's guide containing a selection of possible investigative activities. The support of SSERC in developing these resources is gratefully acknowledged.
- Five skills development resources on 'carrying out web-based research', 'planning and carrying out an experiment', 'processing and analysing data',

▶ The data in Table 2 show the time taken for filter paper discs to float to the surface after the addition of 1 drop of a given algal suspension. We contend that this is a nice experiment and one which offers enormous scope for further investigation (some suggestions are included in [3]).

Concentration of algal stock (%) (undiluted stock = 100%)	Time (s)
100	*
10	21
1	85
0.1	160
0.01	270

Table 2 - 1 drop of a given dilution of *Scenedesmus quadricauda* was added to the surface of a filter paper and placed into a Universal containing 1% hydrogen peroxide solution. The time taken for the filter paper to float to the surface was recorded. \*The catalase activity in the undiluted stock was such that the filter paper did not sink to the bottom of the Universal.

## Summary and Conclusions

The method for the assay of catalase as described in this article offers scope for practical work at various levels of the secondary sector. A full range of curriculum links is available at [www.science3-18.org](http://www.science3-18.org). The resources required to undertake the practical are minimal and should be readily available / accessible to schools and colleges.

## References

1. Curriculum for Excellence: Sciences - Experiences and outcomes – available at <http://www.ltscotland.org.uk/learningteachingandassessment/curriculumareas/sciences/eandos/index.asp> (accessed 1st December 2010).
2. Science education 3-18 website - <http://tinyurl.com/Effervescent-Enzymes> (accessed 13th December 2010); please note that to access the full suite of resources on this website a log-in ID is required.
3. Delpech, R. (2003) Microscale Investigations with Catalase – available at <http://www-saps.plantsci.cam.ac.uk/worksheets/ssheets/SS24.pdf> (accessed 4th December 2010).
4. Catalase - available at <http://en.wikipedia.org/wiki/Catalase> (accessed 5th December 2010).
5. Dann, L. Why do plants produce the enzyme catalase? Available at <http://www-saps.plantsci.cam.ac.uk/records/rec580.htm> (accessed 4th December 2010).

## Technical Details

1. Hydrogen peroxide is readily available from chemical suppliers.
2. The filter papers used were Whatman AA (13 mm) and purchased from Fisher Scientific. With an educational discount a pack of 1000 discs costs approximately £30. However, other filter papers will also work and can be conveniently cut to size with a cork borer or similar.

- ▶ 'writing a scientific communication' and drawing conclusions and evaluating'.
  - Additional notes for teachers plus PowerPoint presentations to support new content areas.
  - A series of animated PowerPoint presentations to support the 'Periodicity, Polarity and Properties' unit.
  - A PowerPoint plus a set of pupil questions with answers to exemplify a new style of exam question from the 'Consumer Chemistry' unit.

## Physics

- A teacher support pack on the new style 'Open-Ended Questions'.
- Two topical 'Researching Physics' support packs looking at seismology and skin-cancer. The support of SSERC in

developing these resources is gratefully acknowledged.

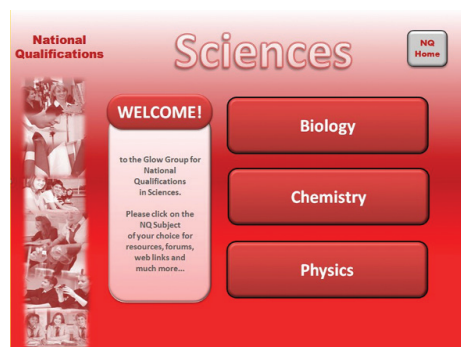
- Additional teachers' notes on areas of new content.
- Pupil questions covering the whole course, with answers provided.
- Pupil summary notes.
- Suggested lessons across all course content, including lessons to develop specific transferable skills.

The new resources are being shared via the 'National Qualifications Sciences' Glow group as soon as they become available, to allow early-adopting schools to prepare for the new Higher curriculum. Subject-specific Glow groups within the main NQ Sciences group also provide opportunities to share and discuss news, information and good practice (via the blog and the forum), as well as to look for CPD opportunities.

Resources are also being published on the appropriate subject area of the National Qualifications site [1] on the LTS website in their finalised form.

## References

- [1] <http://www.ltscotland.org.uk/nationalqualifications/>
- [2] <http://ltsblogs.org.uk/nqscience/>
- [3] <https://portal.glowscotland.org.uk/establishments/nationalsite/NationalQualificationsGroup/NQSciences/default.aspx>
- [4] <http://www.sserc.org.uk/members/SafetyNet/bulls/233/PCR/PCR.htm>



**Figure 3 - National Qualifications Sciences Glow Groups**

In addition, practitioners are encouraged to regularly check the NQ Sciences blog for latest news updates and information relating to the new Highers [2].

Many of the new resources being produced to support the CfE-inspired Highers could also be appropriately used in the delivery of the current Higher Sciences, and teachers are encouraged to familiarise themselves with what is available at the earliest possible opportunity.



**Figure 2 - National Qualifications Sciences Blog**

## Websites and publications round up (precede each web address with http://)



[www.sciences3-18.org](http://www.sciences3-18.org) – Curriculum Resources and CPD



£25 +VAT from SSERC



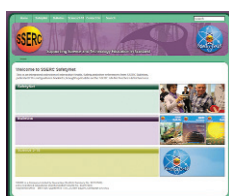
distributed to schools



[tinyurl.com/DS-Equipment](http://tinyurl.com/DS-Equipment)



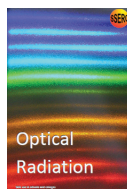
available free from SSERC



[www.sciences3-18.org/sserc](http://www.sciences3-18.org/sserc) – Health & Safety and Bulletins



[tinyurl.com/Expectant-mothers](http://tinyurl.com/Expectant-mothers)



[tinyurl.com/Optical-Radiation](http://tinyurl.com/Optical-Radiation)



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