

Heinemann Science 9: A Contextual Approach

eLearning 9



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Practical notes and advice

The following information is provided to assist teachers in assessing and reducing the safety risk of each experiment. Any assessment of safety risk will need to take into account the circumstances under which the experiment is conducted, including the students' abilities and the teacher's experience.

While every care has been taken in compiling this advice, no guarantee can be given against errors or incompleteness and that regulations and standards will not change. Teachers are encouraged to become familiar with the regulations relating to dangerous goods and hazardous substances and to refer to the MSDS supplied by the manufacturer before using any chemical in an experiment.

Designated hazardous substances are listed in **bold**. Dangerous goods are listed in *italics*. In some cases there are no special risk control measures—the activity is not considered hazardous as long as correct procedures are followed. This is indicated by **RPP** in the table. Rules, precautions and procedures (**RPP**) should be established to minimise risk. Teachers should establish these rules, precautions and procedures and revise them as necessary. Some of these are:

- the correct procedure for lighting and using a Bunsen burner, and safety precautions such as tying back long hair, wearing suitable clothing (low flammability, no trailing sleeves) and footwear .
- care in handling fragile glassware—for example, placing empty test-tubes in racks so they will not roll off the bench, etc.
- safe use of the mains power supply—for example, operating switches with dry hands, not turning switches on until instructed by the teacher, and inserting and removing plugs only when the switch is turned off
- the taping shut of exposed agar plates, and never opening them
- the correct way to deal with chemical spills
- the use of spatulas, etc. to transfer chemicals
- the correct way to mix chemicals in a test-tube—by gentle swirling rather than placing fingers or thumb over the mouth of the tube and shaking
- the correct way to smell gases—by wafting with the hand rather than sniffing directly.

Assessment advice

PURPOSES OF ASSESSMENT

Assessment has a number of different purposes. The results of assessment are used to inform all stakeholders of progress being made by the student. The stakeholders are the parents/carers, teachers and school administration. At times the school systems and education departments also need to know how students in particular schools, or in particular areas, are progressing compared with other students.

Teachers use assessment to:

- improve teaching and learning
- provide feedback and motivate students
- set meaningful priorities
- make decisions about ways of presenting the curriculum.

Students can use the results of assessment to make decisions about their priorities and future directions.

ASSESSMENT AND OUTCOMES

The standards against which assessment decisions are made can be thought of in two different ways:

- how well something has been done
- how much has been done or understood.

In an outcomes approach—which is the approach on the Years 1 to 10 Science Syllabus in Queensland—understanding is the focus.

Development of understanding can be thought of as a road along which the learner travels. As students travel along the road of science education, the experiences they engage with should lead them towards a broader and deeper understanding of the concepts of science. Assessment should provide both students and teachers with opportunities to take stock of how far along the road students have travelled.

The key concepts in the Years 1 to 10 Science Syllabus provide the roads along which to travel. The outcomes are markers along the way—milestones which students should pass as they develop an understanding of each key concept. When students are in Year 8 the ‘typical student’ would be expected to have demonstrated outcomes at Level 4 and be working towards demonstrating outcomes at the next level. Some students will not yet have demonstrated Level 4 outcomes. Other students may have demonstrated Level 5 outcomes or even outcomes at Level 6. Any assessment, therefore, has to provide opportunities for students to demonstrate outcomes at a number of levels.

An outcome is a statement about what students know and what they are able to do with what they know. Assessment tasks should allow students to demonstrate their knowledge and their ability to apply that knowledge in a context.

When developing an assessment task it is important to remember that a task does not have a level. The level comes from the understanding that the student demonstrates through the work produced.

PLANNING FOR LEARNING AND ASSESSMENT

In an outcomes approach, planning for learning and planning for assessment are inextricably linked. When developing a unit of work, identify key concepts that can be linked together in a coherent way. Then identify the relevant, core learning outcomes. Remember you will need to look at the focus level—the level that is ‘typical’ for the students in your class. Look also at the levels below and the levels above.

Analyse the outcomes to identify the knowledge that students will need as they develop understandings. When you fully understand the outcomes and the continuum of understanding of the key concepts they describe through the levels, you will be in a better position to help students develop their understanding of the key concepts. You will also be better able to identify what the typical student will be doing when he/she demonstrates an understanding of the outcomes at the different levels.

These ‘typical demonstrations’ need to be modified according to the specific learning experiences provided for the students and the opportunities students have to demonstrate their understandings. The ‘typical demonstrations’ are the criteria for assessing the students. Based on the assessments you can then decide if a student has demonstrated outcomes at a particular level.

Acids and bases: Home and away with acids and bases!

Acids are a group of substances with similar properties. While you wouldn't test substances by putting them in your mouth, acids were originally known for their sour taste. Acids are responsible for the sour taste of foods such as citrus fruits, yoghurt and vinegar. The acids in foods are relatively weak, however strong acids have been manufactured for use in batteries, as heavy duty cleaners and as reactants in making fertilizers, dyes and explosives. Strong and concentrated acids are known for being highly corrosive.

Bases are another group of substances with similar properties. They tend to have a bitter taste and feel slippery on your skin. In concentrated solutions bases are also highly corrosive and used in drain and oven cleaners.

Acids and bases are often thought of as opposites since by adding them together in the right proportions they cancel each other out and produce a neutral substance. The pH scale is used to indicate whether a substance is acidic, basic or neutral. It also indicates whether a substance is strongly acidic or strongly basic or weakly acidic or weakly basic.

WHAT YOU HAVE TO DO

Read the anticipated evidence (criteria) carefully so that you know exactly what is expected of you. If you do not understand the task ask your teacher for clarification.

MISSION

Our mission as a class is to measure the pH of as many household products as possible.

- Choose ten foodstuffs, drinks, cleaners or other household products.
- Make a list of the products, what they are used for, and what is in them.
- Bring your list to school so that the class as a whole can make up a spreadsheet of all the products. There may be other products that you want to add to the list.
- As a class, form groups so that all of the products are tested in duplicate. Then you can be reasonably sure that the results are accurate.
- Choose the products to be tested by each group, making sure that all of the products are covered.
- As you learn more about indicators and pH, decide how you are going to carry out your pH measurements. Discuss this with your teacher, and any safety requirements involved.
- Get together as a class to fill in the pH of the products on your master list.

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1.1 Atoms and elements

1.2 The beginning of substances

1.3 Chemical reactions

1.4 Webquest—Metals

1.5 Key ideas

2.1 The pH scale

2.2 Properties of acids and bases

2.3 Webquest—pH and your body

2.4 Acid rain

2.5 Key ideas

3.1 Plants at work

3.2 The human digestive system

3.3 A series of unfortunate events



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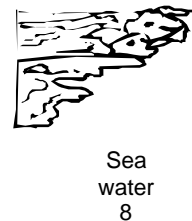
Chapter 2—Acids and bases

Worksheet 1 The pH scale

Questions

1 Colour the pH scale below. Draw a line from each picture to its pH and say if the substance is an acid, a base or neutral.

red	orange	bright yellow	yellow	pale yellow	pale green	green	blue-green	blue	dark blue
1	3	5	6	7	8	9	10	12	14



2 Match each term in the box with its description below.

carbon dioxide	litmus	ascorbic acid	neutralisation	fossil fuels	bases
acetic acid	hydrogen and salt	indicator	pH	acid rain	ammonia

- _____ The type of reaction between an acid and a base.
- _____ An example of an indicator.
- _____ Produced when an acid reacts with a metal.
- _____ A chemical which changes colour with changes in pH.
- _____ Chemical substances regarded as the opposite of acids.
- _____ An acid also known as vitamin C.
- _____ Acid gases are formed when these are burned.
- _____ A base often found in household cleaners.
- _____ A measure of acidity.
- _____ A weak acid found in vinegar.
- _____ Rainwater with a pH below 5.7.
- _____ Produced when an acid reacts with a carbonate.

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Test Generator

The Heinemann Science Test Generator contains over 1400 questions and answers, and is a simple and straightforward way to make tests, assignment sheets and homework handouts. All tests are generated in Microsoft Word and are easy to save, edit and copy for future use.

For the Test Generator to function correctly, it must be installed on your computer's hard disk. Click on the *start installation* button below to begin this process.

To allow access to the advanced functions of the Test Generator, your computer may need to be restarted several times during the installation.

After the Test Generator is installed, launch it from Start > Programs > QBank Generator > Heinemann Science Test Generator.

Login details

User name: teacher

Password: teacher



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