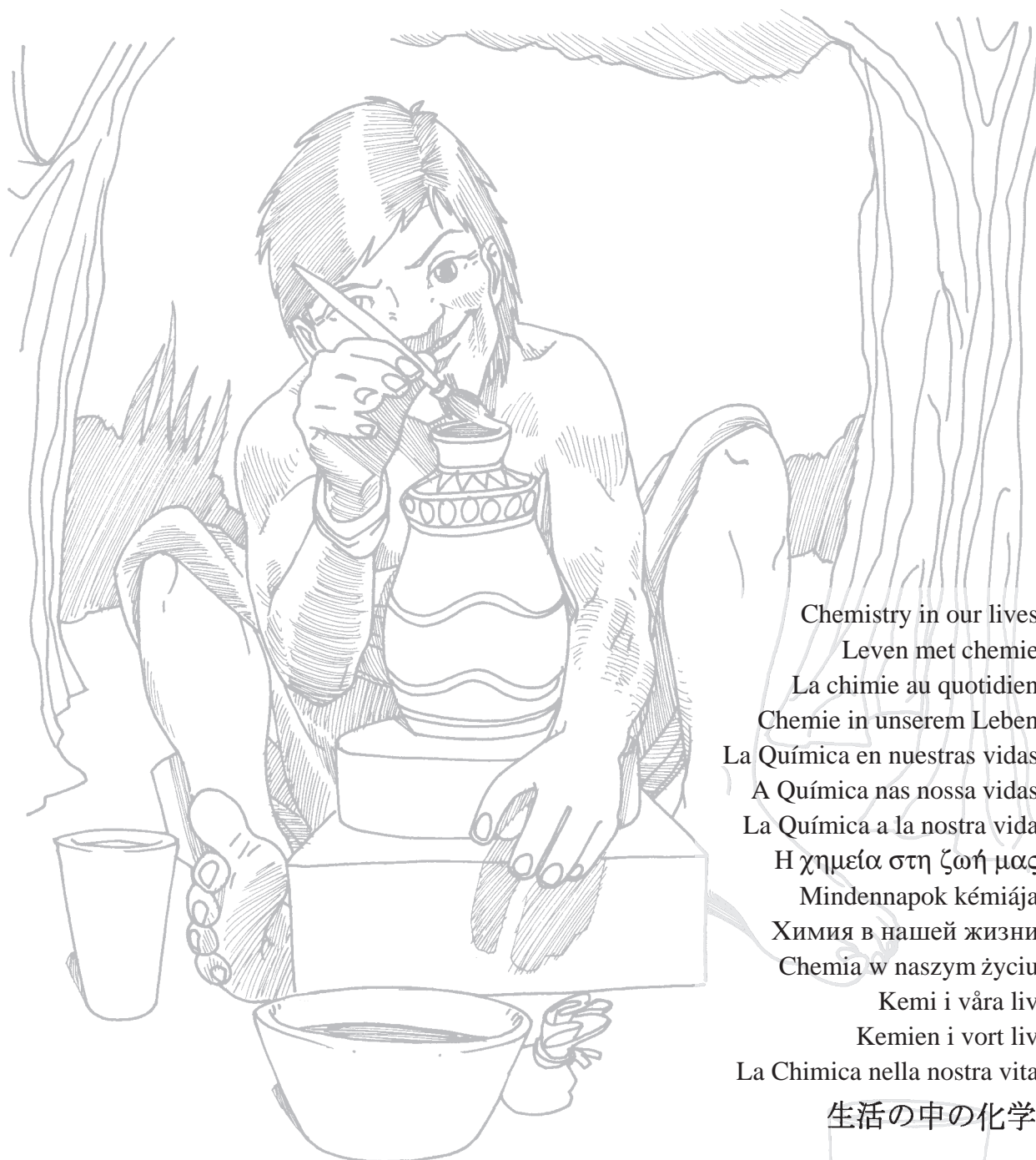




SCIENCE

A C R O S S T H E

WORLD



Chemistry in our lives
Leven met chemie
La chimie au quotidien
Chemie in unserem Leben
La Química en nuestras vidas
A Química nas nossa vidas
La Química a la nostra vida
Η χημεία στη ζωή μας
Mindennapok kémiaja
Химия в нашей жизни
Chemia w naszym życiu
Kemi i våra liv
Kemien i vort liv
La Chimica nella nostra vita
生活の中の化学

English

Science Across the World, a cross curricular project fitting the current trends in education - science, the environment, languages and the newer technologies in one package.

Science Across the World, with its resource materials on environmental and social science topics, provides a forum for students, aged 12 to 19 years, to exchange facts and opinions of their own concern and interest with students in other countries and cultures.

It is this exchange of information which makes the Science Across the World project unique and stimulating to students and teachers alike.

Science Across the World, has developed the following overall aims:

- to bring a global dimension to education by raising awareness of varying perspectives and ways of life of students in different countries
- to raise awareness of the ways science and technology affect society, industry and the environment; and
- to provide opportunities for teachers and students to collaborate with those from other countries; and to develop communication skills, especially languages other than their own.

Starting as Science Across Europe in 1990, the programme has expanded to Science Across Asia Pacific, and in the last two years, Science Across America and Science Across Africa have become well established. The programme has recently expanded into Latin America. In each region, a team of educators together with BP have developed units that are distinctive to the region, and bring the programme to grass roots levels in schools.

For the first time, in November 1997, representatives from all the regions collaborated in Washington DC to produce the first Science Across the World unit – Chemistry in our Lives.

For further details on Science Across the World, please contact your Regional Director.

All contact details are on the back cover of this unit.

Science across the World – How it works

Each unit contains a **Registration Form** which must be returned to the Association for Science Education (ASE) if you wish to contact other schools through the **project's database**. The information on the Registration Form will be entered onto the computerised database of all the schools participating in the **Science Across the World (SAW)** programme.

Once your school is registered with the project, you will be sent the latest printed copy of the database – the **Registered Schools List**.

The database is updated regularly on the SAW web pages – <http://www.bp.com/saw>

The Registered Schools List gives details of all schools wishing to exchange information and opinions on the same topic at the same time. Your choice of schools may be based on any, or all of the criteria that appear on the registration form; namely month of exchange, language, location of the school etc. You may choose to exchange with any school from the list.

The Registered Schools List also contains information about the preferred method of exchange: **post office mailing, fax, email or the Internet using the SAW web pages**.

Your students will then work on collecting the information needed for the exchange. This may be part of the usual classroom work or an extracurricular activity, taking approximately 3-5 hours to complete. All individual or small group information is combined and entered on the **Exchange Form**, which is included in the unit.

Before sending the Exchange Form, many teachers and students choose to make a preliminary, exploratory contact with their selected schools, using a **First Contact Form**, to confirm that they are still planning to use the unit during the stated month. This is advisable to ensure that students are not disappointed by a lack of response.

The Exchange Form is sent both to your selected schools and in response to Exchange Forms that have already been received from other schools. The units are designed so that students and teachers need only work in their own language, if they wish.

The units provide points for discussion and analysis on the Exchange Forms that your school receives so that the global dimension is taken into account.

In addition, in order to enrich the exchange experience, some students send extra information about their schools, their local community and other details of general interest. In many cases, this initial contact, forms the basis for fruitful, longer term links/projects and partnerships between schools.

Once a year schools are sent a new registration form for completion if they still wish to have their entry in the Registered Schools List. **Registration** is free.

Complete registration form and return to ASE for entry into SAW database of registered schools.



Receive Registered Schools List. (Also on SAW web pages)

<http://www.bp.com/saw>



Students work on the unit.



Students/Teachers make preliminary contact with selected schools using the First Contact Form.



Students send completed Exchange Forms to selected schools.

Post Office Mail • Fax • E-mail • Internet



Students receive Exchange Forms, Discussion on the issues raised. Optional development of initial links between schools.



Complete new Registration Form every year for re-entry onto SAW database of registered schools.

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Chemistry in our lives

Part 1 People and chemistry

A brief introduction to the topic with an illustration to show the range of chemical products people use every day. This introduction highlights one of the main themes of the unit, which is that chemical substances are everywhere and it is impossible to consider living without them.

Part 2 Chemistry in our homes

A survey of chemical products in the home. A study of the labelling of one chemical product. Also an opportunity to make a chemical product.

Part 3 Living with chemistry

Research by interview, or from secondary sources, to investigate a local story related to chemistry and to discover an example of the importance of chemistry to the local, regional or national economy.

Part 4 Exchanging information

Collation of information and exchange with other schools.

Part 5 Comparing information from other countries

Comparisons and discussion of responses from different countries.

Part 6 Information section

Table showing formulae and names of some chemical substances in different languages.

The aims of the unit are:

- to increase students' awareness of the importance of chemistry in our everyday lives,
- to increase students' understanding of how to live safely with chemistry,
- to show that chemical substances can mix or combine to form new products,
- to compare aspects of the applications of chemistry in different countries.

This unit will fit into the chemistry curriculum in the first four years of secondary school and illustrates the following fundamental themes of any chemistry course:

- all materials are made up of chemical substances or mixtures of them
- chemical substances can react together to make different substances with new properties
- chemists make new substances by mixing elements and compounds, while controlling the conditions, to produce useful products.

In Parts 1 and 2 students find out more about the many chemical products which people use in their homes. They also examine the labelling of these products and learn about the international symbols for labelling chemical substances. They have an opportunity to make and test a chemical product.

In Part 3 the students examine the importance of chemistry outside their homes in their locality, their region or their country. This provides opportunities to study what chemists do in their work and the importance of chemistry to the economy.

Students exchange their findings with students in other countries. Then they discuss similarities and differences in the impact of chemistry and its products in different parts of the world.

Prior knowledge and skills

The unit is intended for use with students ages 12–16. It is assumed they will have the following prior knowledge and skills.

Knowledge and understanding

Before the students use this unit, they should be aware that:

- some materials are pure while others are mixtures of chemical substances,
- chemistry has developed techniques for separating pure substances from raw materials.

Skills

Students should be able to:

- handle common chemical substances safely,
- extract information from secondary sources,
- conduct an interview.

Instructions for teachers

Requirements

Before beginning the unit provide photocopies of the students' pages for each group of students. It may be helpful to let students see a copy of the Exchange Form at the start so they know what they are aiming to complete during the activities.

Part 2

It will help students to record the results of their surveys if you can give them copies of the table on page 2 of the exchange form. For Activity 2 it may be helpful to provide the class with a selection of packages from chemical products with labels on them. It is safer to provide empty containers. Warn students not to touch, taste or smell the contents of any containers which are not empty.

For Activity 3 the requirements will depend on which product you and your students decide to make. The choice of product is left open so that you can choose an activity which is practicable, safe and relevant. Before trying any practical work you must check that it is allowable in your school.

Part 3

Students will need access to a range of sources including text books, library books, directories and so on. A chemistry society or association may be able to provide information about the industry in your country. The project's web site will give ideas for people with access to the Internet. The address of the web site is: <http://www.bp.com/saw>

Part 4

Students will need a few copies of the Exchange Form to send their findings to other schools. If you have Internet access your students can complete the form on-screen and then send it to other schools by e-mail or fax.

Establishing communication links with other schools before starting detailed work on the unit helps to keep work in step so that the feedback is more immediate. Some schools enjoy exchanging ideas and progress reports by e-mail while they were working on the unit.

Summary of the unit

Part 2 Chemistry in our homes

Introductory chemistry courses often concentrate on pure substances, especially elements and compounds. Separating simple mixtures to make pure substances is often a starting point. The survey in this part of the unit, however, will show students that mixtures are very important. Most useful chemical products in our homes are mixtures. Formulating useful products is an important task for people who work in this field.

Bear in mind the need to be sensitive when asking students to carry out home surveys. Some adults at home may be unhappy if information about home life is reported at school.

Consider discussing the quantities of chemical products which people keep at home. Chemical products may be safe in small quantities but dangerous in larger quantities.

Here are some possible products which you and your students might make:

- crystals of a salt,
- glue,
- soap,
- a cosmetic cream,
- emulsion paint,
- nail lacquer,
- a scented chemical,
- a food flavouring,
- a coloured bead of glass
- a sample of cloth dyed with a natural dye.

Part 3 Living with chemistry

Each group of students might do either 4 or 5 to save time. In Activity 4 it is only necessary to tackle one of the options A, B or C, but if each group chooses a separate topic, they can then report back to the whole class.

In some regions it may seem hard to find a local example of chemistry in action. It is not necessary to choose a big industrial example. Small-scale versions of processes are worth considering such as local brewing or extracting oils, dyes or sugar from plants. Also consider finding out about the work of a pharmacist who may formulate medicines as well as dispensing them.

Consider inviting someone involved in chemistry to come to school to talk to your students while they are working on this part of the unit.

Part 4 Exchanging information

When the students have completed Parts 1, 2 and 3, the class has to decide what to write on the Exchange Form. The class might vote to decide which stories and case studies should feature on the Exchange Form for Activities 4 and 5 in Part 3 of the unit.

Students can use a mixture of words and diagrams on page 4 of the Exchange Form.

Send copies of the form to the schools with which you have been asked to exchange information.

Part 5 Comparing information from other countries

When you have received the Exchange Forms from other schools, copy the Exchange Forms that you have received and the class's own Exchange Forms for comparison and analysis.

After receiving Exchange Forms from other schools, compare and discuss the responses with the help of the questions.

Further activities

Here are some suggestions.

- 1 At the start of the topic give students copies of a label saying: 'This is a chemical substance'. Ask them to stick the labels to materials and products around their home. In this activity you can discuss with students the idea that every material thing can be regarded as being made up of chemical substances (pure or mixtures).
- 2 Give students copies of the international hazard symbols for chemicals (as on page 2 of the Student section). Ask the students to label chemical products in their homes with the labels.
- 3 Choose one everyday product, such as the substance used to clean teeth. Make a special study of the product:
 - what it is made of,
 - its origins,
 - its properties,
 - the labelling of the package,
 - the history (what people used in the past in place of the modern material).
- 4 Create an exhibition or display in your school to tell other students about the work done by your class and what they have found out about chemistry in other parts of the world.

Sources of information

The Science Across the World web site will list useful sources of information especially to help students with the activities in Part 3.

Chemistry in our lives

Date

To
(teacher's name)

School

Address

Tel

Fax

E-mail

School web site address

We understand that your class is studying the subject of chemistry in our lives. We would like to exchange information about the use of chemicals at national and international levels. We enclose the opinions of our class in answer to some of the questions in this unit.

Our students are looking forward to hearing from your class. Please reply.

Date

To
(teacher's name)

School

Address

Tel

Fax

E-mail

School web site address

1 Chemistry in our homes

This table shows examples of chemical products which we commonly use in our homes.

Purpose	Common example of a product in our homes	Source: natural or manufactured, and country of origin	Ingredients listed on the label
Food			
For adding to food during cooking			
For preserving food			
Cleaning			
For keeping people clean			
For washing clothes			
For cleaning surfaces such as floors, walls or windows			
Personal care			
For cosmetic use			
For colouring hair			
Pharmacy			
For treating diseases			
Fuel			
For use as a fuel (cooking, heating, transportation)			
Plant growth and protection			
For growing plants			
For killing insect pests			

2 Labelling chemical products

This is what we think about the standard of packaging, labelling and safety information on the chemical products we find in our homes.

Here is our idea for labelling a chemical product often used in our homes to make sure that young children, or people with poor eyesight can recognise that it can be hazardous.

3 Making a chemical product

This is the chemical product we decided to make: _____

These labelled diagrams show the starting materials we used, the equipment and the main stages of the process.

This is what our product was like and how we tested it.

Chemistry in our lives

Part 1 People and chemistry

You are going to contact students in other parts of the world about how chemistry and chemical products affect our lives.

In Parts 2 and 3 you will find activities which will help you to gather the information you need to fill in the Exchange Form. The numbering of the activities matches the numbering on the Exchange Form.

The drawings on this page illustrate some of the many uses of chemical products we find in our homes. Some of the products come from natural sources, others are manufactured.



Part 2 Chemistry in our homes

Chemistry survey

1 Start this investigation by discovering examples of products which people use for:

- cooking or preserving food,
- cleaning,
- decoration,
- keeping healthy or treating disease,
- fuel,
- growing plants and protecting them from pests.



Do one or both of these activities:

- Keep a diary for a day noting, for each part of the day, the chemical products you use.
- Make a survey of the chemical products in your home. Check with the adults in your home that it is all right for you to do the survey before you start.

Record your findings in a table like this. Your teacher may provide a copy of the table on the Exchange Form to help you.

Purpose	Common examples of a product in our homes	Source: natural or manufactured, and country of origin	Main ingredients

Labelling chemical substances and products

There is an international set of symbols used to label chemical substances as shown on this page. In some countries these symbols are not only used in laboratories and in industry, they are also used to label chemicals which people buy to take home.



2 Look at some containers of everyday chemical products that can be hazardous if they are not used properly. Examples are bleach, paraffin and medicines. Do the labels on the containers give safety information? Do the labels include standard hazard signs?

Design a new label for one of the products. You might design a label which would be easily understood by a very young child or by a person with poor eyesight.



Safety note

Do not touch, taste or smell the contents of any of the containers.

Making a chemical product

3 You are going to make and test a chemical product. Your teacher will give you instructions on how to do this.

Part 3 Living with chemistry

A story about chemistry

4 In this part of the unit you are going to find a story about chemistry which comes from where you live and which you think will interest people in other parts of the world. There are three suggestions here, but you may prefer an idea of your own which illustrates how chemistry affects people in your region.

Suggestion A – Chemistry then and now

Interview an older person about a change they have seen in their lives because of developments in chemistry. Choose a topic such as materials used to make a household article (a container for example), methods of washing and keeping clean, medicines, growing food, fuels or any other example of a product of chemistry.

Here is a set of headings you could use on the exchange form.

- This is the person we interviewed ...
- This the topic for the interview...
- This is the situation when the person was young ...
- These are some of the changes we were told about ...
- This is what the situation is like now...

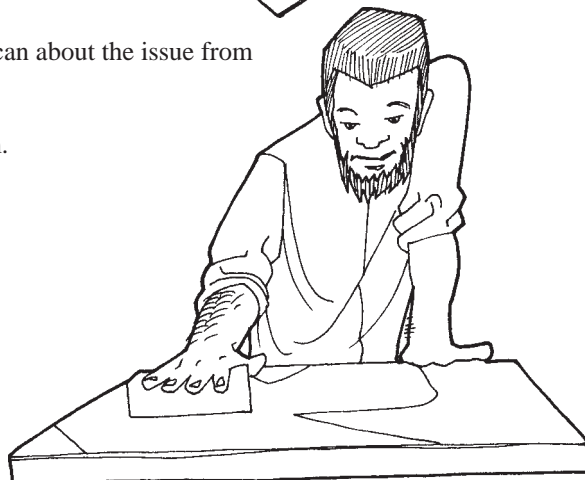


Suggestion B – A topical issue

Pick a topical issue to do with chemistry. Find out what you can about the issue from the news and other sources.

Here is a set of heading you could use on the Exchange Form.

- A topical story about chemicals in our country is...
- Reports suggest that the public attitude to this story is ...
- The benefits of chemicals mentioned in this story are ...
- The chemical hazards and risks are ...
- Our attitudes are ...

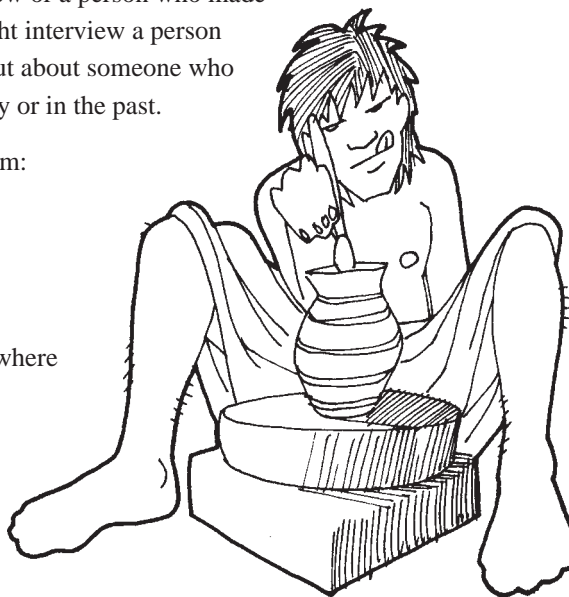


Suggestion C – A person involved in chemistry

This could be the work of a person working in chemistry now or a person who made an important contribution to chemistry in the past. You might interview a person who uses chemistry at work. Alternatively choose to find out about someone who has made a contribution to chemistry in your region recently or in the past.

Here is a set of heading you could use on the Exchange Form:

- This is the person we are writing about ...
- This is why we chose to find out about this person ...
- This is the connection the person has with chemistry ...
- This is how the work of the person has affected people where we live ...
- This is the most interesting thing we have learnt about this person ...



Chemistry and the economy

5 In all countries, chemistry has played a part in developing the economy. You are going to find an example of a contribution made by chemistry to your local, regional or national economy. Find an example as near to your school as possible. The example might be a large-scale industrial process or it might be a small scale process such as home brewing or colouring textiles with dyes from plants or even baking bread.

Here are some possible topics.

- A raw material which is mined, quarried or extracted – for example, salt from the sea or brine, crude oil from oil wells, a mineral from rocks, gases from the air, or products such as starch, sugars, oils or dyes from plants.
- A process for separating or refining raw materials – for example, oil refining or metal extraction.
- A process for converting raw materials into pure chemical substances – for example, the production of chlorine, alkalis, acids, metals, alcohol or sugar.
- A process for combining chemical substances to make useful products – for example, making soaps, plastics, glass, bleaches, perfumes or medicines.
- A process for producing food or drink.

Part 4 Exchanging information

In this part of the unit you will exchange information with students in different countries.

Your teacher has an Exchange Form which contains questions similar to those you answered in Parts 2 and 3. As a class decide what information to write on it.

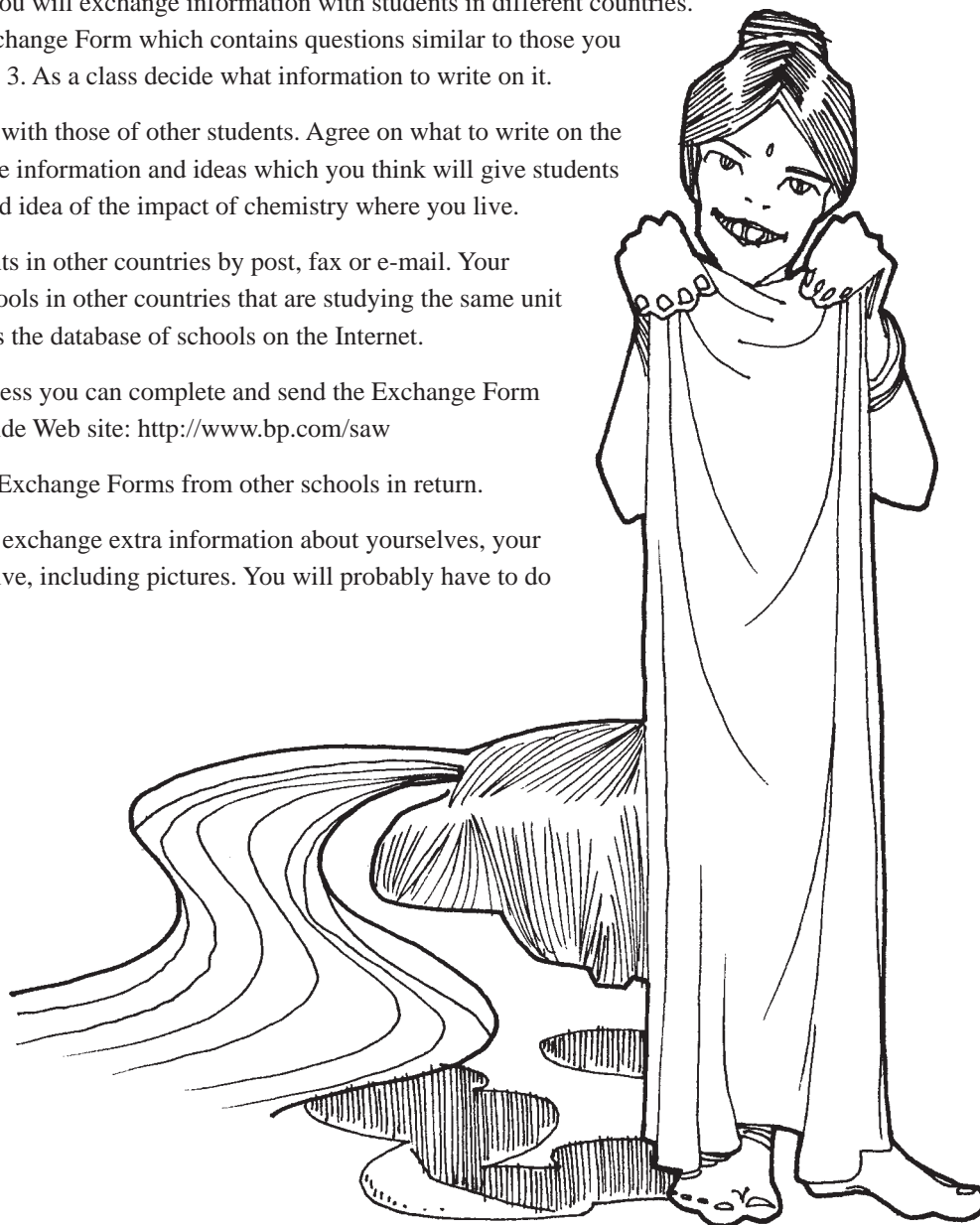
Compare your findings with those of other students. Agree on what to write on the Exchange Form. Choose information and ideas which you think will give students in other countries a good idea of the impact of chemistry where you live.

Send the form to students in other countries by post, fax or e-mail. Your teacher has a list of schools in other countries that are studying the same unit of work. You can access the database of schools on the Internet.

If you have Internet access you can complete and send the Exchange Form on line at this World Wide Web site: <http://www.bp.com/saw>

Your class will receive Exchange Forms from other schools in return.

It is often interesting to exchange extra information about yourselves, your school and where you live, including pictures. You will probably have to do this by post.



Part 5 Comparing information from other countries

When you have received the Exchange Forms you can discuss the following ideas.

Chemical products in our homes

- What have you found out about the similarities and differences between the chemicals people use in their homes in different countries?
- What explanations can you suggest for the similarities and differences you have noticed?
- How do the standards of labelling vary from country to country?
- Are there differences across the world in the meaning of the term chemical or chemical substance?
- What strikes you about the chemical products made at other schools? How similar or different are the methods and apparatus used in other schools to the methods you have used?



Living with chemistry

- What do you notice about the similarities and differences between the chemicals stories that other students have written on their Exchange Forms? What do the stories tell you about the attitudes of students to chemistry and chemical products?
- How important does the chemical industry appear to be in the countries from which you have received Exchange Forms?
- What is the most unexpected or interesting piece of information you have found in the Exchange Forms?
- How has your work on this unit changed your knowledge, understanding and appreciation of chemistry?

Part 6 Information section

Table showing formulas and names of some familiar elements and compounds

Language	H ₂ O	NaCl	H ₂ SO ₄	C ₂ H ₅ OH	Fe	Cu	S
English	water	sodium chloride (salt)	sulphuric acid	ethanol (alcohol)	iron	copper	sulphur
Nederlands	water	natrium chloride (zout)	zwavelzuur	ethanol (alcohol)	ijzer	koper	zwavel
Español	agua	cloruro de sodio (sal común)	ácido sulfúrico	etanol (alcohol)	hierro	cobre	azufre
Français	eau	chlorure de sodium (sel)	acide sulfurique	éthanol (alcool)	fer	cuivre	soufre
Deutsch	Wasser	Natriumchlorid (Salz)	Schwefel-säure	Äthanol (Alkohol)	Eisen	Kupfer	Schwefel
Português	Água	Cloreto de sódio (sal)	Ácido sulfúrico	Etanol (álcool etílico)	Ferro	Cobre	Enxofre
Svenska	vatten	natrium-klorid (salt)	svavelsyra	etanol (alkohol)	järn	koppar	svavel
Italiano	acqua	cloruro di sodio (sale)	acido solforico	etanolo (alcool)	ferro	rame	zolfo
Dansk	vand	natrium klorid (salt)	svovlsyre	ethanol (alkohol)	jern	kobber	svovl
Catalá	aigua	clorur de sodi (sal)	àcid sulfúric	etanol (alcohol)	ferro	coure	sofre