



# NEW SCIENCE AHEAD



8

# New ScienceAhead

has been developed in accordance with

- the CBSE's educational initiatives for effective teaching and learning
- the guidelines laid down in the National Curriculum Framework
- tried and tested methodology in the teaching of science
- the needs of the teacher and the student



## Students' Book

- complete syllabus coverage
- experiments and activities
- carefully graded text
- appealing images and layout

## Teachers' Resource Pack

- For each lesson:
  - lesson plan
  - question bank with answers
  - worksheet with answers
  - answers for exercises in the students' book
  - activities for assessment
- Tests\* and examination papers with answers

\* for classes 3–8

## In the Students' Book

### Concept Development

#### Learning Objectives

- encourage students to evaluate their progress and take responsibility for their learning



#### Lesson Text

- carefully graded
- enables understanding
- visually appealing

#### In-lesson Activities

- help students develop a scientific temperament



#### Case Studies

- in-depth coverage of important topics



#### Assess Yourself

- summarises the lesson
- enables easy revision



#### Bloom's Taxonomy\*

a write-up summarising Bloom's taxonomy of educational objectives, with a handy table of question cues and learning outcomes

\* in the preliminary pages

### Reference

#### Science Tidbit

- nuggets of interesting information



#### Be Inspired! Scientists and Values

- information on people who have expanded the world of science or made the world a better place



#### OUR HERITAGE

- an exploration of India's rich heritage in science



#### Internet Links

- enable students to use IT to explore topics in greater depth

#### Glossary

- definitions of technical terms



## Smart Book for Teachers

**NEW!**

informative, interactive and exciting, with:

- animations
  - picture galleries
  - videos
  - interactive tasks
  - presentations
  - teachers' resources
- including
- extra questions
  - worksheets
  - concept maps
  - question-paper generator

## Students' App

**NEW!**

questions that help students  
review lessons  
for classes 3–8

## Web Support

a portal dedicated to the series  
with free access for teachers



## In the Students' Book

### Skill Development

#### Looking Back

- within-lesson questions
- immediate feedback for the teacher

#### Exercises

- multiple choice questions (MCQs)
- true or false
- fill in the blanks
- diagram-based questions
- short- and long-answer questions
- ...and more

#### Activities for Assessment

- science experiments
- written assignments
- simple projects
- presentations (IT)
- model making
- field trips
- ...and more

#### Higher-order Thinking Skills

- questions to improve students' analytical and problem-solving skills

#### Life Skills

- decision making
- problem solving
- critical thinking
- self management
- effective communication
- ...and more

#### Fun Activities

- activities that make learning science joyful

### Testing

#### Tests

- short tests to assess students' understanding of concepts
- for classes 3–8

**NEW!**

#### National Science Olympiad Practice Papers

- for competitive examination practice

#### Examination Papers

- for examination practice

# NCERT SYLLABUS

Questions	Key Concepts	Resources	Activities/Processes (Periods - 22)
<b>1. Food</b> <i>Crop production</i> Crop production: How are different food crops produced?  What are the various foods we get from animal sources? <i>Micro-organisms</i> What living organisms do we see under a microscope in a drop of water? What helps make curd? How does food go bad? How do we preserve food?	Crop production: Soil preparation, selection of seeds, sowing, applying fertilizers, irrigation, weeding, harvesting and storage; nitrogen fixation, nitrogen cycle.  Micro organisms – useful and harmful.	Interaction and discussion with local men and women farmers about farming and farm practices; visit to cold storage, go- downs; visit to any farm/nursery/ garden.  Microscope, kit materials; information about techniques of food preservation.	Preparing herbarium specimens of some crop plants; collection of some seeds etc; preparing a table/chart on different irrigation practices and sources of water in different parts of India; looking at roots of any legume crop for nodules, hand section of nodules.  Making a lens with a bulb; Observation of drop of water, curd, other sources, bread mould, orange mould under the microscope; experiment showing fermentation of dough – increase in volume (using yeast) – collect gas in balloon, test in lime water.
<b>2. Materials</b> <i>Materials in daily life</i> Are some of our clothes synthetic? How are they made? Where do the raw materials come from? Do we use other materials that are synthetic?  Do we use cloth (fabric) for purposes other than making clothes to wear?  What kind of fabric do we see around us? What are they used for? <i>Different kinds of materials and their reactions.</i> Can a wire be drawn out of wood?  Do copper or aluminium also rust like iron? What is the black material inside a pencil? Why are electrical wires made of aluminium or copper? <i>How things change/ react with one another</i> What happens to the wax when a candle is burnt? Is it possible to get this wax back?  What happens to kerosene/natural gas when it is burnt?  Which fuel is the best? Why?	Synthetic clothing materials. Other synthetic materials, especially plastics; usefulness of plastics and problems associated with their excessive use.  There are a variety of fibrous materials in use. A material is chosen based on desired property.  Metals and non-metals.  Combustion, flame  All fuels release heat on burning. Fuels differ in efficiency, cost etc. Natural resources are limited. Burning of fuels leads to harmful by products.	Sharing of prior knowledge, source materials on petroleum products.  Collection of material from neighbourhood or should be part of the kit.  Kit items.  “The Chemical History of a Candle”, by M. Faraday, 1860. Collecting information from home and other sources.	Survey on use of synthetic materials. Discussion.  Testing various materials – for action of water, reaction on heating, effect of flame, electrical conductivity, thermal conductivity, tensile strength.  Simple observations relating to physical properties of metals and non-metals, displacement reactions, experiments involving reactions with acids and bases. Introduction of word equations.  Experiments with candles.  Collecting information. Discussions involving whole class.



Questions	Key Concepts	Resources	Activities/Processes
<p>3. <b>The World of the Living</b> <i>Why conserve</i></p> <p>What are reserve forests/sanctuaries etc? How do we keep track of our plants and animals? How do we know that some species are in danger of disappearing?</p> <p>What would happen if you continuously cut trees?</p> <p><i>The cell</i></p> <p>What is the internal structure of a plant –what will we see if we look under the microscope? Which cells from our bodies can be easily seen? Are all cells similar?</p>	<p>Conservation of biodiversity/wild life/plants; zoos, sanctuaries, forest reserves etc. flora, fauna endangered species, red data book; endemic species, migration.</p> <p>Cell structure, plant and animal cells, use of stain to observe, cell organelles – nucleus, vacuole, chloroplast, cell membrane, cell wall.</p>	<p>Films on wild life, TV programmes, visit to zoo/forest area/sanctuaries etc.; case study with information on disappearing tigers; data on endemic and endangered species from MEF, Govt. of India, NGOs .</p> <p>Microscope, onion peels, epidermal peels of any leaves, petals etc, buccal cavity cells, Spirogyra; permanent slides of animal cells.</p>	<p>Discussion on whether we find as many diverse plants/animals in a 'well kept area' like a park or cultivated land, as compared to any area left alone. Discussion on depletion of wild life, why it happens, on poaching, economics.</p> <p>Use of a microscope, preparation of a slide, observation of onion peel and cheek cells, other cells from plants e.g. Hydrilla leaf, permanent slides showing different cells, tissues, blood smear; observation of T.S. stem to see tissues; observing diverse types of cells from plants and animals (some permanent slides).</p>
<p>How do babies develop inside the mother? Why does our body change when we reach our teens?</p> <p>How is the sex of the child determined? Who looks after the babies in your homes?</p> <p>Do all animals give birth to young ones?</p> <p>4. <b>Moving things, People and Ideas</b> <i>Idea of force</i></p> <p>What happens when we push or pull anything?</p>	<p>Sexual reproduction and endocrine system in animals, secondary sexual characters, reproductive health; internal and external fertilisation.</p> <p>Idea of force-push or pull; change in speed, direction of moving objects and shape of objects by applying force; contact and non-contact forces.</p>	<p>Counsellors, films, lectures.</p> <p>Daily-life experience, kit items.</p>	<p>Discussion with counsellors on secondary sexual characters, on how sex of the child is determined, safe sex, reproductive health; observation on eggs, young ones, life cycles.</p> <p>Discussion on Gender issues and social taboos.</p>
<p>How can we change the speed, direction of a moving object?</p> <p>How can we shape the shape of an object?</p> <p>Friction</p> <p>What makes a ball rolling on the ground slow down?</p>	<p>Friction – factors affecting friction, sliding and rolling friction, moving; advantages and disadvantages of friction for the movement of automobiles, airplanes and boats/ships; increasing and reducing friction.</p> <p>Idea of pressure; pressure exerted by air/liquid; atmospheric pressure.</p>	<p>Various rough and smooth surfaces, ball bearings.</p> <p>Daily-life experiences; Experimentation – improvised manometer and improvised pressure detector.</p>	<p>Observing and analysing the relation between force and motion in a variety of daily-life situations.</p> <p>Demonstrating change in speed of a moving object, its direction of motion and shape by applying force. Measuring the weight of an object, as a force (pull) by the earth using a spring balance.</p> <p>Demonstrating friction between rough/smooth surfaces of moving objects in contact, and wear and tear of moving objects by rubbing (eraser on paper, card board, and sand paper).</p> <p>Activities on static, sliding and rolling friction. Studying ball bearings.</p> <p>Discussion on other methods of reducing friction and ways of increasing friction.</p>
<p>Why are needles made pointed? Why does a balloon burst if too much air is blown into it? Why does an inverted glass/bottle/pitcher resist being pushed down into water?</p> <p>How can air/liquids exert pressure?</p>	<p>Pressure</p> <p>Why are needles made pointed? Why does a balloon burst if too much air is blown into it? Why does an inverted glass/bottle/pitcher resist being pushed down into water?</p> <p>How can air/liquids exert pressure?</p>	<p>Observing the dependence of pressure exerted by a force on surface area of an object.</p> <p>Demonstrating that air exerts pressure in a variety of situations.</p>	<p>(Periods - 44)</p>

Questions	Key Concepts	Resources	Activities/Processes
<i>Sound</i> How do we communicate through sound? How is sound produced? What characterises different sounds?	Various types of sound; sources of sound; vibration as a cause of sound; frequency; medium for propagation of sound; idea of noise as unpleasant and unwanted sound and need to minimise noise.	Daily-life experiences; kit items; musical instruments.	Demonstrating that liquids exert pressure. Designing an improvised manometer and measuring pressure exerted by liquids. Designing improvised pressure detector and demonstrating increase in pressure exerted by a liquid at greater depths.
<b>5. How Things Work</b> <i>Electric current and circuits</i> Why do we get a shock when we touch an electric appliance with wet hands? What happens to a conducting solution when electric current flows through it?	Water conducts electricity depending on presence/absence of salt in it. Other liquids may or may not conduct electricity. Chemical effects of current.	Rubber cap, pins, water, bulb or LED, cells, various liquids. Carbon rods, beaker, water, bulb, battery.	Demonstrating and distinguishing different types (loud and feeble, pleasant/ musical and unpleasant / noise, audible and inaudible) of sound. Producing different types of sounds, using the same source. Making a 'Jal Tarang'. Demonstrating that vibration is the cause of sound. Designing a toy telephone. Identifying various sources of noise. (unpleasant and unwanted sound) in the locality and thinking of measures to minimise noise and its hazards (noise-pollution).
How can we coat an object with a layer of metal?	Basic idea of electroplating.	Improvised electrolytic cell, CuSO <sub>4</sub>	(Periods - 14) Activity to study whether current flows through various liquid samples (tap water, salt solution, lemon juice, kerosene, distilled water if available). Emission of gases from salt solution. Deposition of Cu from copper sulphate solution. Electric pen using KI and starch solution.
<b>6. Natural Phenomena</b> <i>Rain, thunder and lightning</i> What is lightning? What safety measures should we take against lightning strikes?	Clouds carry electric charge. Positive and negative charges, attraction and repulsion. Principle of lightning conductor.	Articles on clouds and lightning; kit items.	Simple experiment to show electroplating. (Periods - 26) Discussion on sparks. Experiments with comb and paper to show positive and negative charge. Discussion on lightning conductor.
<i>Light</i> What are the differences between the images formed on a new utensil and an old one? Why is there this difference? When you see your image in the mirror it appears as if the left is on the right – why? Why don't we see images on all surfaces around us? What makes things visible?	Laws of reflection. Characteristics of image formed with a plane mirror. Regular and diffused reflection. Reflection of light from an object to the eye.	Mirror, source of light, ray source (mirror covered with black paper with a thin slit). Plane glass, candle, scale. Experience.	Exploring laws of reflection using ray source and another mirror. Locating the reflected image using glass sheet and candles. Discussion with various examples. Activity of observing an object through an object through a straight and bent tube; and discussion.
How do we see images of our back in a mirror?	Multiple reflections.	Mirrors and objects to be seen.	Observing multiple images formed by mirrors placed at angles to each other.
Why do we sometimes see colours on oil films on water?	Dispersion of light.	Plane mirror, water.	Making a kaleidoscope. Observing spectrum obtained on a white sheet of paper/wall using a plane mirror inclined on a water surface at an angle of 45°.



Questions	Key Concepts	Resources	Activities/Processes
What is inside our eye that enables us to see?	Structure of the eye.	Model or chart of the human eye.	Observing reaction of pupil to a shining torch.
Why are some people unable to see?	Lens becomes opaque, light not reaching the eye. Visually challenged use other senses to make sense of the world around. Alternative technology available.	Experiences of children; case histories.	Demonstration of blind spot.
<i>Night sky</i> What do we see in the sky at night? How can we identify stars and planets?	Role of nutrition in relation to blindness. Idea about heavenly bodies/celestial objects and their classification – moon, planets, stars, constellations. Motion of celestial objects in space; the solar system.	Samples of Braille sheets.	Activities with Braille sheet.
<i>Earthquakes</i> What happens during an earthquake? What can we do to minimise its effects?	Phenomena related to earthquakes.	Observation of motion of objects in the sky during the day and at night; models, charts, role-play and games, planetarium.	Observing and identifying the objects moving in the sky during the day and at night. Observing and identifying some prominent stars and constellations. Observing and identifying some prominent planets, visible to the naked eye, (Venus, Mars, Jupiter) in the night sky and their movement. Design and preparing models and charts of the solar system, constellations, etc. Role play and games for understanding movement of planets, stars etc.
<b>7. Natural Resources</b> <i>Man's intervention in phenomena of nature</i> What do we do with wood?	Consequences of deforestation: scarcity of products for humans and other living beings, change in physical properties of soil, reduced rainfall. Reforestation; recycling of paper.	Earthquake data; visit to seismographic centre.	Looking at structures/ large objects and guessing what will happen to them in the event of an earthquake; activities to explore stable and unstable structures.
What if we had no wood? What will happen if we go on cutting trees/grass without limit?	Consequences of deforestation: scarcity of products for humans and other living beings, change in physical properties of soil, reduced rainfall. Reforestation; recycling of paper.	Data and narratives on deforestation and on movements to protect forests.	Narration and discussions.
What do we do with coal and petroleum?	Formation of coal and petroleum in nature. (fossil fuels?). Consequences of over extraction of coal and petroleum.	Background materials, charts etc.	Project- Recycling of paper.
Can we create coal and petroleum artificially? <i>Pollution of air and water</i> What are the various activities by human beings that make air impure?	Water and air are increasingly getting polluted and therefore become scarce for use. Biological and chemical contamination of water; effect of impure water on soil and living beings; effect of soil containing excess of fertilisers and insecticides on water resources. Potable water.	Description of some specific examples of extremely polluted rivers.	Discussion. Case study and discussion.
Does clear, transparent water indicate purity?			Purification of water by physical and chemical methods including using sunlight. Discussion on other methods of water purification.





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Be Inspired!

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Orient Black Swan

# Adolescence



## Learning Objectives

By the end of the lesson, you will be able to:

- 📖 describe the endocrine system
- 📖 describe functions of different endocrine glands
- 📖 describe the changes that take place during puberty and adolescence
- 📖 describe the reproductive phase in humans
- 📖 explain the importance of health during adolescence

## THE ENDOCRINE SYSTEM

You know that nerve cells send messages from one part of the body to another. Another way of sending messages is through chemical messengers known as **hormones**.

*Hormones are substances that are secreted by **glands**<sup>1</sup> and are transported to other parts of the body to affect the functioning of other organs and tissues.* Glands that produce hormones are called **endocrine glands**, and make up the **endocrine system** in the body. Some examples of endocrine glands are the pituitary, thyroid, ovaries and testes. These glands do not have **ducts** (tubes) for transporting hormones from one part of the body to another. So they are also called **ductless glands**.

Hormones are secreted in small amounts. They act on areas far away from where they are secreted. They are secreted directly into the blood or lymph. Once they are in the circulatory system, the hormones are sent to all parts of the body. *The organs that respond to the hormones are called **target organs**.*

<sup>1</sup>**gland** an organ that synthesises and secretes substances

Both endocrine glands and the nervous system work together in a coordinated manner to control organs and tissues.

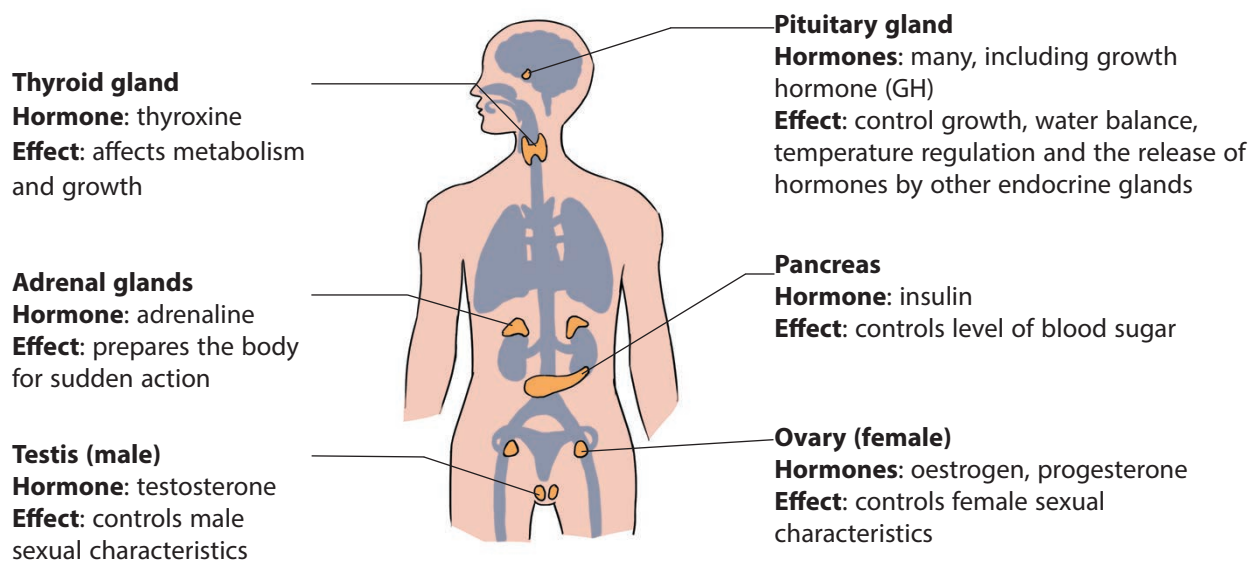
## The Endocrine Glands

### Thyroid gland

The thyroid gland is located in the neck. It secretes the hormone **thyroxine**. Thyroxine plays an important role in metabolism, physical growth and mental development. Thyroxine deficiency may be caused by malfunctioning of the thyroid gland or due to a deficiency of iodine in a person's diet. If the diet lacks iodine, the thyroid gland may become enlarged as it tries to produce enough iodine for the body. The condition in which the thyroid gland becomes enlarged is called **goitre**.

### Adrenal glands

Have you felt tense during a game, or afraid that a dog might bite you? In such situations of excitement, fear or stress, the body becomes tense and the heart beats fast. This is due to the secretion of the hormone **adrenaline** by the adrenal glands, which



**Fig. 10.1** The endocrine glands: main hormones produced and their functions

Note: Only some hormones produced by the glands are mentioned.

are located above the kidneys. Adrenaline helps the body prepare for action. The effects are felt within minutes of circulation of the hormone. However, they are temporary and do not last for a long time.

### *Pancreas*

The pancreas produces digestive juices and releases them through ducts into the small intestine. It also has groups of cells called the **islets of Langerhans**, which secrete the hormone **insulin** directly into the bloodstream. Insulin controls the level of glucose in the blood. When the level is high, insulin helps certain cells to take up and convert the excess glucose in blood to **glycogen** for storage. If the pancreas does not secrete enough insulin, an excess of glucose remains in the blood, which can result in the disease **diabetes**. Diabetes

can lead to heart disease and other problems.

### *Gonads*

These are the **ovaries** in females and **testes** in males. Apart from producing ova and sperms, they release important hormones called **sex hormones**.

In females, the ovaries produce the female hormones **oestrogen** and **progesterone**. Oestrogen stimulates the development of female characteristics and the release of eggs from the ovaries. Progesterone prepares the uterus for pregnancy.

In males, the testes produce the male hormone **testosterone**. This hormone stimulates the development of male characteristics and the production of sperms in the testes.



Table 10.1 Hormone-producing glands and their hormones

Gland	Location	Secretion	Function
Thyroid	Neck	Thyroxine	Controls metabolic rate
Adrenal	Above the kidneys	Adrenaline	Prepares body for emergencies
Pancreas	Abdomen	Insulin	Regulates amount of glucose in blood
Testes	Pelvic region (male)	Testosterone	Controls sexual development
Ovaries	Pelvic region (female)	Oestrogen and progesterone	Controls sexual development
Pituitary	Brain	Growth hormone, stimulating hormones	Stimulates growth, stimulates other glands

### Pituitary gland

The pituitary gland is a pea-sized gland situated under the brain. It controls many other endocrine glands. It is therefore called the master gland of the endocrine system. The pituitary gland produces growth hormone (GH), which is essential for the growth of the body. It also produces hormones that act upon other endocrine glands. The thyroid-stimulating hormone (TSH) stimulates the thyroid gland to produce thyroxine. The gonad-stimulating hormones stimulate the gonads to secrete sex hormones.

### Hormones and Metamorphosis

Insects and amphibians go through many stages of development before becoming adults, a process called metamorphosis. In frogs, thyroxine controls metamorphosis. If the thyroid gland is removed from a frog larva, the tadpole will not develop into an adult frog. Since the production of thyroxine requires iodine, a tadpole in water that does not contain iodine will not develop into an adult frog. **Moulting**<sup>2</sup> and metamorphosis in insects are also controlled by hormones.

### Looking Back

#### Understanding



Answer the following questions.

1. Which system secretes hormones in humans?
2. What is the function of adrenaline?
3. Which gland secretes insulin?
4. Name the sex hormones.
5. Which gland is called the master gland?

### PUBERTY AND ADOLESCENCE

Do you realise how much you have changed since you joined school? A baby grows to

become a child. The child then develops into an adolescent, who becomes an adult by the age of about 17–20.

<sup>2</sup>moulting the shedding of old skin, feathers or hair

baby → child → adolescent → adult

Humans can reproduce only after achieving sexual maturity. *The stage of life during which the body becomes capable of reproduction is known as **puberty**.* The start of puberty varies from person to person. It usually begins between the ages of 9 and 14 in boys, and between 8 and 13 in girls.

On reaching puberty, a child becomes an **adolescent**. *The period of transition from a child to an adult is known as **adolescence**.* During adolescence, the body undergoes several changes. Emotional and mental changes also take place during this period. Adolescence ends in adulthood.

During puberty, the pituitary produces gonad-stimulating hormones. These act on the gonads, which then produce sex hormones. The actions of all these hormones, which are released into the bloodstream, cause physical changes in the body and lead to mental and emotional changes.

## Physical Changes

### Maturation of reproductive organs

- In boys, the **testes** begin to secrete testosterone. The testes and penis become larger. The testes start producing the **sperms**.
- In girls, the **ovaries** begin to secrete oestrogen and progesterone. The ovaries grow larger and start releasing mature **eggs (ova)**.

In addition to acting on the reproductive organs, sex hormones also act on other

parts of the body, bringing about many visible changes.

These physical changes that are not directly related to the reproductive system but help to differentiate between males and females (such as in terms of body shape and voice) are known as **secondary sex characteristics**.

### Growth of the body

There is a sudden increase in height during puberty. Adolescents often look awkward during this period because different parts of the body grow at different rates. This is because cell division occurs more quickly in some parts of the body. For example, the arms and legs grow faster than other parts. However, as the adolescent approaches adulthood, the body regains its normal proportions. Eventually the body stops growing, usually by the age of about 18–20.

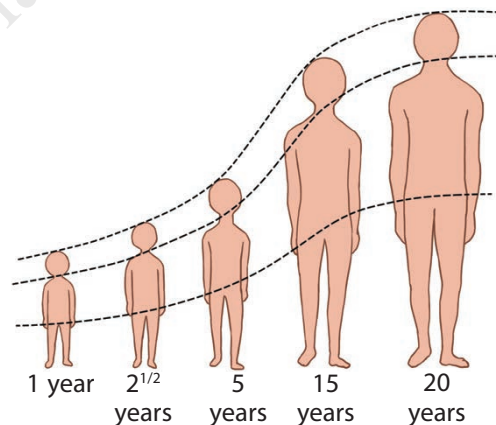


Fig. 10.2 Growth pattern in humans



#### Activity 10.1

#### Understanding

**Aim:** To track your growth

**Method:** Measure your height and weight once every month.

Tabulate your readings to track your growth.

### *Changes in body shape*

In boys, the shoulders become broader and the chest becomes wider. The body becomes more muscular than in girls.

In girls, the hips become wider and rounder. The breasts grow in size. The mammary glands (milk-secreting glands) in the breasts develop further.

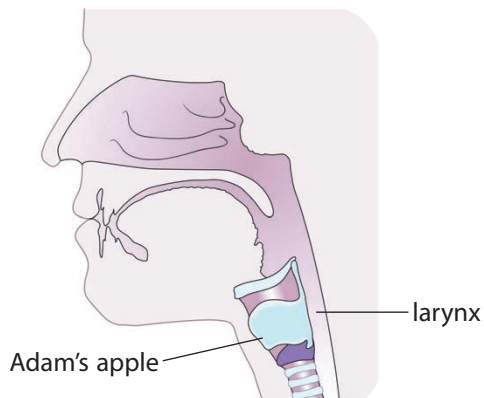
### *Growth of body hair*

In both boys and girls, hair starts growing in the armpits and in the pubic area. In boys, facial hair (beard and moustache) and chest hair develop.

### *Change in voice*

The voice box or the **larynx** grows in both boys and girls. However, it becomes larger in boys than in girls. This is why men have a deep voice, whereas women have a higher-pitched voice. In adolescent boys, the voice often cracks (changes suddenly, becoming high or low). This is a temporary change, and the voice becomes steady once the larynx has matured.

In boys, a part of the larynx projects at the front of the neck. This projection is commonly known as the **Adam's apple**.



**Fig. 10.3** Adam's apple

### *Activity of sweat and oil glands*

There is an increase in the activity of the sweat and oil glands, resulting in increased sweating. The breakdown of sweat by



**Fig. 10.4** Acne

bacteria leads to body odour. The skin becomes oilier, often leading to **acne** (a skin condition in which **pimples** develop), especially on the face.

### **Other Changes**

Apart from visible physical changes, many mental and emotional changes take place during adolescence.

### *Changes in behaviour and attitude*

Young boys and girls find themselves changing emotionally and psychologically during the adolescent stage. Many adolescents feel the need to make independent choices and decisions, but also need the support of family and friends. This often makes them feel conflicted. Hormonal changes sometimes cause mood swings.

### *Sexual feelings*

Adolescents sometimes develop feelings of attraction towards others as they attain maturity. Such feelings are normal.

## Adulthood

The period of adolescence is accompanied by conflicts in the mind, but most teenagers cope with these and grow up to be responsible young adults. The stage that follows adolescence is **adulthood**. An adult individual attains full physical growth and a great amount of mental and emotional stability.

## THE REPRODUCTIVE PHASE

The reproductive phase of females starts at about 10–13 years of age (about two years after the first physical changes associated with puberty are observed) and continues until 45–50 years of age. During this period, every 28–30 days, one of the two ovaries releases an egg. This is known as **ovulation**. Over a period of days before and after ovulation, the walls of the uterus develop a thick lining that is rich in blood vessels in preparation for possible pregnancy.

- If the egg is fertilised by fusing with a sperm, a zygote is formed. The zygote develops into an embryo, which may become implanted on the wall of the uterus. Successful implantation results in pregnancy. The embryo develops into a baby over a period of about nine months.
- If the egg is not fertilised, the egg and the thickened lining of the uterus, along with its blood vessels, are shed. This causes bleeding for four to six days. This is known as **menstruation** or a **period**.

*The regular monthly cycle of egg maturation and release, along with changes in the uterus*

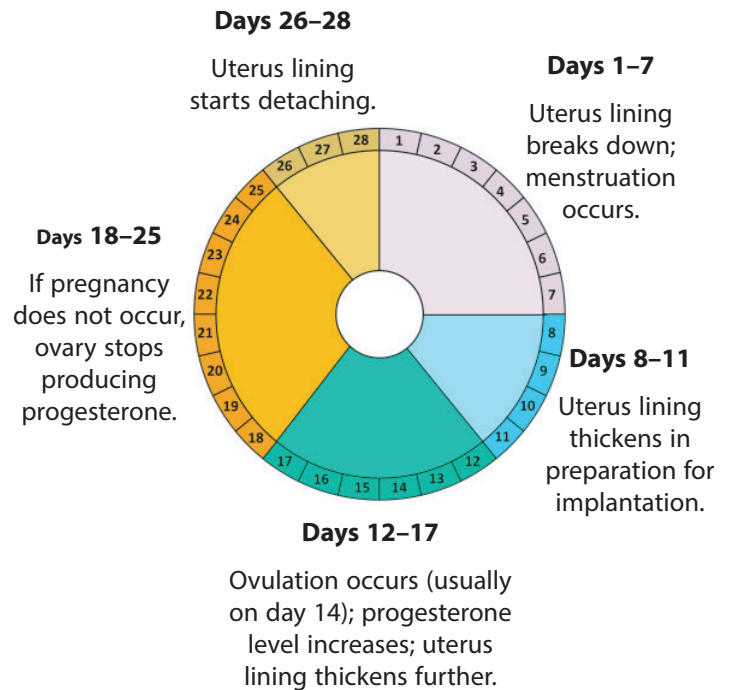


Fig. 10.5 The menstrual cycle

wall, is known as the **menstrual cycle**. The menstrual cycle is controlled by hormones.

The first menstrual flow is known as **menarche**. The menstrual cycle may be irregular initially but usually becomes regular over time.

The menstrual cycle usually stops between the ages of 45 and 55. The stopping of the menstrual cycle is known as **menopause**. It marks the end of the female's reproductive phase. In contrast, the capacity to produce sperms lasts much longer in males.

## ADOLESCENT HEALTH

Adolescence is a time when individuals mature mentally, physically and socially. An adolescent's food choices are very important for supporting the growing body and to avoid health problems in the future.

An adolescent needs a balanced diet with the right amounts of carbohydrates, proteins, fats, vitamins and minerals to be healthy.

Such a diet should include the following:

- calorie- and protein-rich foods (grains, nuts, pulses, milk and milk products, eggs, fish and meat) to meet energy and growth requirements
- foods with sufficient calcium and iron (milk, green leafy vegetables, meat and beans) to keep bones strong and to prevent anaemia
- a variety of fruits and vegetables to provide different nutrients

One should not miss meals, but should avoid processed foods high in fat and sugar, including carbonated drinks.

Exercise is necessary to be fit, reduce stress and have a healthy body. Sufficient sleep is also needed for rest and recovery.

Personal hygiene is very important, especially for girls during menstruation. Regular washing with soap and water can help prevent body odour.

### **Problems Faced by Adolescents**

Adolescence is a stage often accompanied by insecurity and confusion. Physical changes make adolescents feel self-conscious about their body. These changes are normal and are a part of growing up.

The mood swings that occur in an adolescent due to hormonal changes can be difficult to handle. The adolescent is often unsure of himself or herself, but wants to be independent. Adequate support from family and friends is essential.

Some adolescents may be tempted to use cigarettes, drugs and alcohol. These are **addictive** substances. This means that when a person starts using them regularly, the body and mind become dependent on them. It is difficult to stop using them even when the person wants to. These substances can cause great harm to the body and mind. In addition, sharing needles to inject drugs can lead to the spread of infections, including deadly diseases like **AIDS** and **hepatitis B**. When confused, the adolescent could seek guidance from informed adults and not rely only on information from **peers** (people in the same age group).

Adolescents, especially girls, face **peer pressure** to stay slim or to maintain a certain appearance. It is very important to have a balanced diet and to avoid fad<sup>3</sup> diets, which could lead to eating disorders such as **anorexia**.

Medical problems, such as depression, can also affect the adolescent and cause emotional instability.

During adolescence, boys and girls may develop feelings of attraction towards each other. Impulsive sexual activities may lead to teenage pregnancy. Since young girls and boys are not fully mature physically as well as emotionally, and are not capable of supporting children, this may lead to serious problems. Sexually transmitted infections (STIs) may also be a problem. It is a good idea for adolescents to consult a professional counsellor or advisor and obtain information and suggestions on developing healthy relationships, reproductive health and safe sexual practices.

<sup>3</sup>fad a craze for something, usually temporary





## Case Study

### Child marriage in India

According to Indian law, the age of marriage for girls is 18 and that for boys is 21.

Forcing or tricking those younger than this age to marry is illegal. Despite this, the practice of child marriage is still widespread in many parts of India. Determined action from all parts of society—including children and youth—is needed to stop this practice.

The following links have inspiring stories of children who resisted or stopped child marriages.

<http://unicef.in/Story/714/Brave-Girls-Say-No-To-Child-Marriage->

<http://www.thehindu.com/2004/01/20/stories/2004012007890100.htm>

<http://achhikhabre.com/rekha-kalindi-child-marriage-bravery-award/>

## Looking Back

### Understanding



### Fill in the blanks.

1. The stage of life between childhood and adulthood is called \_\_\_\_\_.
2. The male hormone \_\_\_\_\_ is released by the \_\_\_\_\_.
3. The female hormones \_\_\_\_\_ and \_\_\_\_\_ are released by the \_\_\_\_\_.
4. The reproductive age of a woman starts with the first period, called \_\_\_\_\_, and lasts till \_\_\_\_\_.

## Assess Yourself



### Mark ✓ if you have understood the concept.

- ✎ The endocrine system consists of glands that secrete hormones. The hormones control several processes in the body.
- ✎ The testes in males produce testosterone. The ovaries in females produce oestrogen and progesterone.
- ✎ The pituitary gland is known as the master gland as it produces several hormones that stimulate other glands to secrete their hormones.
- ✎ The stage of life during which the body becomes capable of reproduction is known as puberty.
- ✎ The period of transition from a child to an adult is known as adolescence.
- ✎ Some characteristics that are observed during puberty are development of the reproductive organs, sudden increase in height, changes in body shape, development of body hair, changes in voice, increased activity of the sweat and oil glands, arousal of sexual feelings, and changes in behaviour and attitude.
- ✎ The regular monthly cycle of egg maturation and release, and changes in the uterus wall, is known as the menstrual cycle.
- ✎ A balanced diet, exercise and personal hygiene are important for adolescent health.
- ✎ Adolescence is a time of great change, and adolescents should depend on informed adults for guidance during this period of transition.

*For self assessment*





# Exercises



## Remembering/Understanding/Applying

### Multiple choice questions

#### A. Choose the correct option.

- Hormones are secreted directly into the \_\_\_\_\_.  
a) blood or lymph      b) nerves  
c) heart                      d) liver
- Which of the following glands secretes the hormone thyroxine?  
a) pituitary                      b) thyroid  
c) adrenal                      d) pancreas
- Which hormone is responsible for metamorphosis in frogs?  
a) adrenaline                      b) insulin  
c) thyroxine                      d) oestrogen
- The stage during which the body becomes capable of reproduction is called \_\_\_\_\_.  
a) menstruation                      b) puberty  
c) menopause                      d) adulthood
- Puberty occurs between the ages of \_\_\_\_\_.  
a) 3 and 4                      b) 8 and 14  
c) 18 and 21                      d) 40 and 45
- Which of these is the male sex hormone?  
a) testosterone                      b) oestrogen  
c) thyroxine                      d) adrenaline
- Which of these is the female sex hormone?  
a) testosterone                      b) adrenaline  
c) thyroxine                      d) oestrogen
- Which of these is **not** a secondary sex characteristic?  
a) development of body hair  
b) formation of the ovaries  
c) change in body shape  
d) change in voice

- A woman's first menstruation is called \_\_\_\_\_.  
a) menarche                      b) period  
c) menopause                      d) puberty

*For peer assessment*

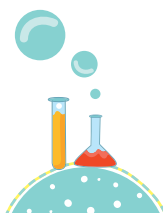
### Objective-type questions

#### B. Fill in the blanks.

- Hormones are produced by \_\_\_\_\_ that make up the \_\_\_\_\_ system.
- The organs that respond to hormones are called \_\_\_\_\_ organs.
- The hormone \_\_\_\_\_ prepares the body to face dangerous situations.
- In the absence of \_\_\_\_\_ in water, tadpoles cannot change into frogs.
- In adolescents, the arms and legs grow \_\_\_\_\_ than other parts of the body.
- Boys develop a deeper voice than girls because their \_\_\_\_\_ becomes bigger.
- If an egg is not fertilised, it is expelled from the body during \_\_\_\_\_.
- The female is in the reproductive phase between menarche and \_\_\_\_\_.

#### C. Say whether the statements are true or false.

- The endocrine and nervous systems work independent of each other.
- Goitre is a sign of insulin deficiency.
- The hormone TSH stimulates the gonads to secrete sex hormones.
- In general, puberty starts earlier in girls than in boys.



- Teenagers generally sweat more than younger children.
- Menstruation does not take place if the egg is fertilised and implanted.
- It is difficult to stop taking drugs because they are addictive.

### Short answer questions

#### D. Answer in brief.

- What are hormones?
- Why are endocrine glands called ductless glands?
- What happens when the body is unable to produce enough insulin?
- Which endocrine gland present in a human male is not present in a human female?
- What is puberty?
- What is adolescence?
- What are secondary sex characteristics? Give an example.

- Mention two consequences that can result from unsafe sexual practices.

### Long answer questions

#### E. Answer in detail.

- Discuss the endocrine system and its functions.
- What are gonads? What hormones do they produce and what are the functions of these hormones?
- Discuss the importance of the pituitary gland.
- Explain the changes that take place in the reproductive system during puberty.
- Give a brief description of how the body changes in boys and girls during puberty. (Mention changes other than those affecting the reproductive system.)
- Explain the menstrual cycle with the help of a diagram.
- Discuss some of the problems associated with adolescence.



### Higher-order Thinking Skills

- Why are adolescents usually advised to include more calcium in their diet than adults?
- Why do you think adolescents are more prone to drug abuse than young children? Give reasons.



### Life Skills

#### Dealing with acne

Acne is a common teenage problem. But you can deal with it by learning about the causes and the remedial measures that can be taken. To learn more, visit the sites given below:

<http://www.nhs.uk/Conditions/Acne/Pages/Introduction.aspx>

<https://www.aad.org/public/diseases/acne-and-rosacea/acne>

<http://www.webmd.com/skin-problems-and-treatments/teen-acne-13/>





## Enrichment Activities



### I. Research project

Applying

Sexually transmitted infections (STIs) are infections that can be transferred from one person to another through sexual contact. They are caused by different bacteria and viruses. An infected person may not show any symptoms until the later stages of the infection and may unknowingly pass the infection to others. Gonorrhoea, genital herpes, genital warts, syphilis and AIDS (acquired immune deficiency syndrome) are some sexually transmitted diseases.

Work in groups. Find out more about these diseases, how they spread and how they are treated.

### II. Meet and discuss

Evaluating

Have a discussion on: **Gender issues and social taboos in India**

### Internet Links

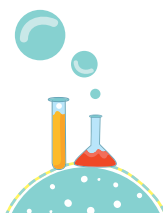


<http://www.cyh.com/HealthTopics/HealthTopicDetailsKids.aspx?p=335&np=307&id=1658#>

[http://kidshealth.org/kid/grow/body\\_stuff/](http://kidshealth.org/kid/grow/body_stuff/)



Orient Black Swan



# Chemical Effects of Current



## Learning Objectives

By the end of the lesson, you will be able to:

- ☞ differentiate between conductors and insulators
- ☞ explain conductivity in liquids
- ☞ describe electrolysis and the chemical effects of electric current
- ☞ list some applications of electrolysis

## CONDUCTORS AND INSULATORS

You have already learnt that some materials allow electricity to flow through them while others do not. *Materials that allow electricity to flow through them are called **conductors**.*

All metals are generally good conductors. *Materials that do not allow electricity to flow through them are called **bad conductors** or **insulators**.* Non-metals (except graphite), wood, glass and plastics are bad conductors.

*The measure of the ability of a substance to conduct electricity is called **electrical conductivity**.* Conductors show good conductivity, while insulators show poor conductivity.

## CONDUCTIVITY OF LIQUIDS

Let us now carry out a simple activity (Activity 14.1) to see if liquids can conduct electricity. A simple **tester** is used to check if a solid is a conductor or an insulator. However, since most liquids are not as

good conductors of electricity as metals, the current in the circuit may be very small.

A **light emitting diode (LED)** is therefore used to test if a liquid is a good conductor.

An LED lights up even if the current flowing through it is very small. LEDs are commonly used in displays of electronic appliances such as audio and video players.

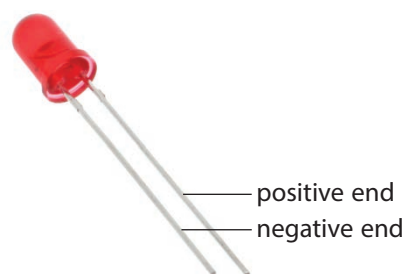


Fig. 14.1 An LED



An LED has two ends or **electrodes**. The longer lead of the LED is usually the positive electrode (**anode**) and should be connected to the positive end of the cell. The shorter end is the negative electrode (**cathode**) and should be connected to the negative end of the cell.



### Activity 14.1

**Aim:** To study the flow of electric current through liquids

**Materials required:** cells, LED, connecting wires, plastic bottle caps, small amounts of distilled water, well water, common salt solution, copper sulphate solution, lime juice, tap water and kerosene

#### Method

1. Make a simple circuit as shown, using cells, an LED and connecting wires.
2. Connect the cell and LED as shown in the figure.
3. Fill the plastic bottle caps with the different liquids.
4. Dip the ends of the connecting wires into the cap filled with distilled water. Keep the ends of the connecting wires close together, but make sure they do not touch.

Note whether the bulb glows. Repeat the experiment with the other liquids, making sure to clean the wires thoroughly before testing each liquid. Tabulate your results.

#### Observations and conclusions

The bulb glows if the liquid conducts electricity. The bulb does not glow if the liquid does not conduct electricity.

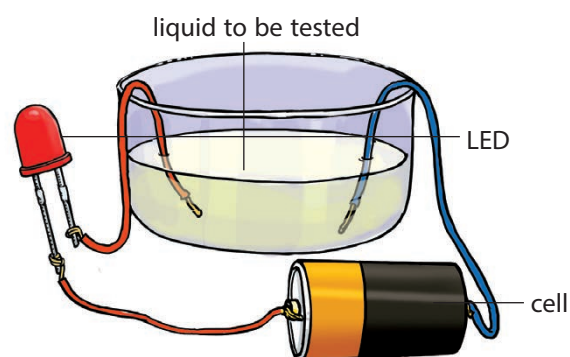


Fig. 14.2 Testing the conductivity of liquids

You will notice from Activity 14.1 that distilled water is a poor conductor of electricity. However, water from wells and ponds that contains impurities in the form of dissolved salts is a good conductor.

Tap water, lime juice and salt solution are also conductors, whereas kerosene is not. Tap water is a conductor because it has several dissolved salts. This is the reason we should never touch an electric appliance with wet hands. Doing so may cause an electric current to flow through the body and give us an electric shock.

When salts are dissolved in water, they form **ions**. *Ions are atoms or groups of atoms with an electric charge. Positively*

*charged ions are known as **cations**, whereas negatively charged ions are known as **anions**.*

Conduction of electricity in solutions and certain other liquids occurs due to the movement of these cations and anions. A liquid that contains ions and thus conducts electricity is called an **electrolyte**. Most electrolytes are solutions of acids, bases or salts. Liquids that do not form ions and therefore do not conduct electricity are **non-electrolytes**.

## ELECTROLYSIS

Let us carry out Activity 14.2 to see what happens when electricity passes through a conducting liquid.





### Activity 14.2

**Aim:** To study the chemical effect of current

**Materials required:** water in a beaker, dilute sulphuric acid, connecting wires, two cells, two test tubes, two copper rods or plates, copper sulphate solution in a beaker

#### Method—Experiment I

1. Take water in a beaker. Add a few drops of dilute sulphuric acid to it.
2. Connect one end of each connecting wire to a dry cell. Hammer the other ends to flatten them, and then dip them in the water.
3. You will see bubbles of gases coming from the water near the wires. Now fill two test tubes with water and invert them over the beaten ends of the wires.
4. Allow the gases to collect for several minutes (Fig. 14.3). Test the gases using a splinter.

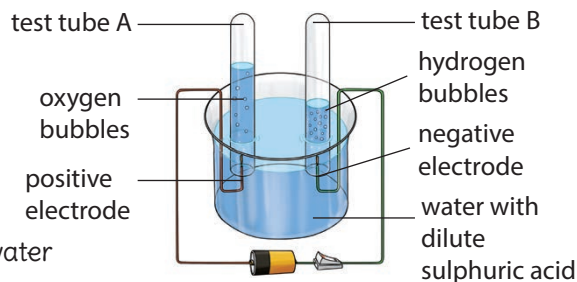


Fig. 14.3 Electrolysis of water

#### Observations

When a glowing splinter is held near test tube A, it bursts into flame. When a burning splinter is held near test tube B, the gas burns with a 'pop'. This shows that oxygen is evolved at the positive electrode and hydrogen at the negative electrode.

*Note:* A little salt may be added to the water instead of dilute sulphuric acid. Do not add a large amount, as this can lead to the evolution of chlorine gas.

#### Method—Experiment II

1. Connect the two copper rods to a cell with wires.
2. Dip the rods in copper sulphate solution (Fig. 14.4).
3. Allow the current to flow for about half an hour.

#### Observations

A fresh, shiny, reddish deposit of copper is seen on the negative copper rod (cathode). If the rods are weighed before and after passing the current, you will notice that the cathode weighs more after the current is passed through it, and the anode weighs less.

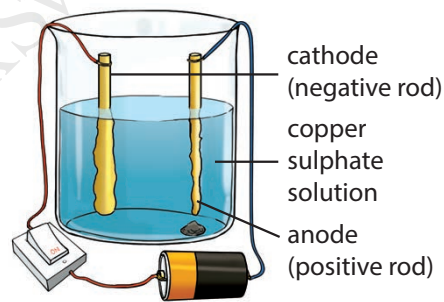


Fig. 14.4 Electrolysis of copper sulphate solution

You can conclude from the first experiment of Activity 14.2 that the electric current causes water to break up into its constituent gases, hydrogen and oxygen.

The copper deposit on the negative copper rod (cathode) in the second experiment comes from the copper sulphate in the solution. Thus, electric current breaks up copper sulphate solution too. The copper that is removed from the solution is replaced by copper from the positive copper rod (anode).

*The chemical decomposition of a conducting liquid or solution when an electric current is passed through it is called **electrolysis**.*

### Chemical Changes During Electrolysis

Activity 14.2 establishes that when electric current is passed through certain liquids or solutions that conduct electricity, chemical changes occur. This is called the **chemical effect** of electric current. This is dependent

on the nature of the material used as the electrodes and the electrolyte. The chemical effect can be seen in the formation of bubbles due to the production of gases, change in the colour of the electrolyte and/or the deposition of metal or another substance on one of the electrodes.

An **electrolytic cell** is a cell in which electrolysis takes place. A typical electrolytic cell consists of:

- An external source of electricity, such as a cell or battery
- Two electrodes—anode and cathode—that are made of conducting material. The anode is the electrode connected to the positive terminal of the battery. The cathode is the electrode connected to the negative terminal of the battery.
- An electrolyte into which the electrodes are inserted

The electrolyte contains positively charged cations and negatively charged anions. When the circuit of the electrolytic cell is closed and current passes through the electrodes, the anions move towards the positively charged anode. The cations move towards the negatively charged cathode. Thus, current flows through the electrolyte and chemical changes occur.

## Applications of Electrolysis

Electrolysis has many applications. Some major applications are:

- The **extraction of highly reactive metals** like aluminium and sodium from their ores, since they cannot be displaced from their compounds by other (less reactive) metals

- **Electrorefining**, that is, the purification of metals such as copper, tin, silver and gold, which are often needed in purer form than can be obtained through normal chemical reactions

- **Electroplating**

### Electroplating

Electroplating is the process of coating a thin layer of one metal over another by electrolysis. Metals commonly deposited by electroplating are chromium, nickel, gold, silver, tin and zinc.

- Chromium is deposited on iron and other metals to give them a shiny appearance and to protect them from corrosion. Car parts, bathroom fixtures and wheel rims are electroplated.
- Gold and silver are deposited on jewellery made of cheaper metals to make them look more attractive.
- Tin is deposited on iron or steel cans used as food containers, to prevent the reaction of food with iron.
- Zinc is deposited on iron surfaces to prevent them from rusting. An example of this is zinc deposition on iron used in buildings, bridges and water pipes.



a. Gold-plated watch    b. Tin-plated food containers

Fig. 14.5 Some electroplated items





### Activity 14.3

**Aim:** To electroplate a key

**Materials required:** copper sulphate solution in a beaker, iron key, electric cell, copper plate or copper wire

#### Method

1. Connect a clean iron key to the negative terminal of the electric cell.
2. Connect the copper plate or wire to the positive terminal of the battery.
3. Dip the key and copper plate in the beaker with the copper sulphate solution. Allow current to pass through the circuit for several minutes.

Do you see a deposit of copper on the iron key?

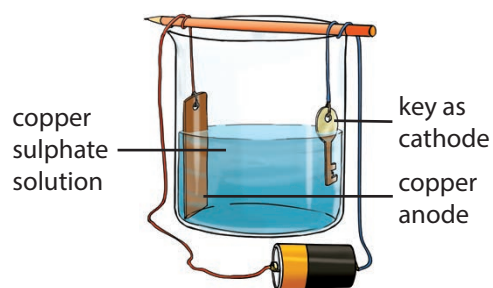


Fig. 14.6 Electroplating

## Looking Back

### Understanding



Match the words in the two columns.

#### Column A

1. glass
2. well water
3. anion
4. zinc
5. anode

#### Column B

- a. electroplated on iron
- b. positively charged electrode
- c. insulator
- d. good conductor
- e. negatively charged ion

## Assess Yourself



Mark ✓ if you have understood the concept.

- ✎ Materials that allow electricity to flow through them are called conductors. All metals are generally good conductors.
- ✎ Materials that do not allow electricity to flow through them are called bad conductors or insulators. Non-metals (except graphite), wood, glass and plastics are bad conductors.
- ✎ The measure of the ability of a substance to conduct electricity is called electrical conductivity.
- ✎ Ions are atoms or group of atoms with an electric charge.
- ✎ A liquid or solution that contains ions and thus conducts electricity is called an electrolyte.
- ✎ The chemical decomposition of a liquid or solution when an electric current is passed through it is called electrolysis.
- ✎ Electroplating is the process of coating a thin layer of one metal over another by electrolysis.

For self assessment



# Exercises



## Remembering/Understanding/Applying

### Multiple choice questions

#### A. Choose the correct option.

1. A liquid that conducts electricity due to the presence of ions is called a/an \_\_\_\_\_.  
a) anode                      b) electrolyte  
c) cathode                    d) electrode
2. Which of the following are electrolytes?  
(i) impure water              (ii) kerosene  
(iii) salt solution              (iv) copper  
a) (i) and (ii)                  b) (ii) and (iii)  
c) (i) and (iii)                  d) (ii) and (iv)
3. Which of the following are non-electrolytes?  
(i) lemon juice                (ii) distilled water  
(iii) kerosene                  (iv) copper sulphate solution  
a) (i) and (ii)                  b) (ii) and (iii)  
c) (i) and (iv)                  d) (ii) and (iv)
4. Which of these are applications of electrolysis?  
a) metal extraction          b) electroplating  
c) electrorefining            d) all the three
5. Which of these metals is deposited on iron objects to give them a shiny look and to protect them from corrosion?  
a) gold                          b) silver  
c) chromium                  d) tin
6. Which of these metals is deposited on iron to prevent it from reacting chemically with food?  
a) gold                          b) silver  
c) chromium                  d) tin

*For peer assessment*

### Objective-type questions

#### B. Fill in the blanks.

1. The only non-metal that is a conductor of electricity is \_\_\_\_\_.
2. Tap water conducts electricity because it has dissolved \_\_\_\_\_.
3. Electrolytes contain positive and negative \_\_\_\_\_.
4. An \_\_\_\_\_ is a conducting liquid or solution that breaks up chemically when an electric current is passed through it.
5. Liquids that do not conduct electricity are called \_\_\_\_\_.
6. The anode is connected to the \_\_\_\_\_ terminal of a battery.
7. The process used to purify metals is called \_\_\_\_\_.
8. If you are electrically depositing metal A on metal B, you are \_\_\_\_\_ B with A.

#### C. Say whether the statements are true or false.

1. An LED can be connected in a circuit in any direction, just like a torch bulb.
2. Touching an electrical appliance with wet hands can be very dangerous.
3. If electric current is passed through pure water, it will break down to give hydrogen and oxygen.
4. A chemical change always accompanies electrolysis.
5. An electric current causes a chemical change in a solid conductor.



- An electric current causes a chemical change in an electrolyte.
- Anions are attracted to the cathode.
- Electroplating is used to protect expensive metals.

### Short answer questions

#### D. Answer in brief.

- What is an electrolyte?
- What is electrolysis?
- What is the 'chemical effect' of current?
- What are the changes observed after the electrolysis of copper sulphate using copper electrodes?

- What is meant by the term electroplating?

### Long answer questions

#### E. Answer in detail.

- Differentiate between electrolytes and non-electrolytes. Give two examples of each and describe an experiment to identify them as electrolytes and non-electrolytes.
- Describe an experiment to show the chemical effect of current.
- How are the chemical effects of electric current put to use by humans?
- What are the uses of electroplating?
- Describe how you electroplate an iron spoon with copper.



### Higher-order Thinking Skills

- The electric supply should be disconnected from the mains in case of seepage of water near an electrical point. Why?
- The inside of a fruit such as an orange conducts electricity. What enables it to conduct electricity?
- In the experiment on plating an iron key with copper, what changes will you observe in the mass of the electrodes (the key and the copper plate) before and after the experiment? Will there be a change in the mass of the electrolyte? Draw the circuit diagram of the setup used to electroplate an iron spoon with copper.



### Life Skills

#### Precautions to be taken while handling electric cells

Electric cells contain electrolytes inside. The following links explain the risks of mishandling cells and the precautions to be taken to prevent mishaps.

- <http://www.mpoweruk.com/instructions.htm>
- <http://www.iec.ch/about/brochures/pdf/tools/batteries.pdf>



### Enrichment Activities

#### I. Research project

Applying

Chrome-plated items can be decorative, provide resistance to corrosion, ease cleaning procedures, or increase surface hardness. However, there are certain health hazards associated with chromium. Find

out about the disadvantages of chrome plating from the health and environment point of view and write a short single-page report on the topic.

## II. Experimental projects

Applying

### Making a fruit cell

**Aim:** To make a fruit cell to generate electricity

**Materials required:** lemons, grapefruits, tomatoes, oranges, LED, zinc wire or rods, thick copper wire or rods (results will be better with rods)

### Method

- Insert the ends of the zinc and copper wire to a depth of 2–3 cm into one of the fruits. This is your fruit cell. Connect the fruit cell to an LED. Does the fruit cell give enough voltage to light up the LED? If so, record how long the LED stays lit. If the LED does not light up, make more fruit cells and connect them in series.
- Record the number of fruit cells needed to light up the LED.
- Record the results for each fruit.

### Making an electric pen

**Aim:** To make an electric pen

**Materials required:** a battery of three or four cells, potassium iodide solution, starch solution, a flat copper-bottomed cooking vessel, a paper napkin, insulated connecting wires

### Method

1. Invert and place the cooking vessel on a table. Fix one end of a wire to the copper base of the vessel, using sticky tape.
2. Connect the other end to the positive terminal of the battery.
3. Mix the potassium iodide and starch solutions.
4. Dip the paper napkin in this solution and spread it on the copper base of the inverted vessel.
5. Connect one end of another wire to the negative end of the battery, and keep the other end free.
6. Write on the napkin with this free end.

*Note:* Be careful as you write, as electricity is passing through the insulated wire.

## III. Make and present

Applying

LEDs are soon expected to replace other kinds of bulbs in the lighting industry. Make a presentation or a website on LEDs, emphasising the advantages they offer over other types of bulbs.

To make and share a website, go to <http://www.students.websiteforever.com>, the safest website builder for students. This facility comes to you courtesy Orient BlackSwan and Akmin Technologies, and does not require any technical expertise.

## IV. Visit and report

Evaluating

Visit a commercial electroplating unit in your city. Find out about the hazards in an electroplating unit that threaten the workers. Write a report on this and present it in your class.

### Internet Links

<http://science.howstuffworks.com/electroplating-info.htm>  
<http://electronicsclub.info/leds.htm>



# NEW SCIENCEAHEAD

CLASS 8

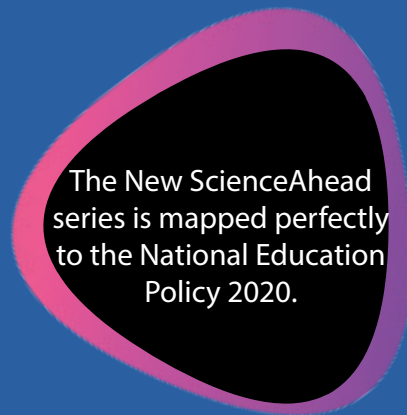


Orient BlackSwan

The National Education Policy (NEP) 2020 emphasises certain crucial parameters based on content and pedagogy.

The New ScienceAhead series provides a rich range of exercises and activities for each of the parameters.

Here is a quick reference guide to some of the examples in this book.



The New ScienceAhead series is mapped perfectly to the National Education Policy 2020.

## 21<sup>st</sup> Century Skills

A broad set of skills, knowledge, work habits and character traits that are important for success in the 21<sup>st</sup> century

## Experiential/Constructivist Approach

Learners construct their knowledge, based on what they already know, through experience or by doing and reflection

## Integrated Approach

An approach to teaching and learning that works by connecting knowledge and skills across the curriculum, by bringing real life examples to the classroom

The NEP parameters	Features	Page nos.
The 4Cs		
Communication	Enrichment Activities	61
Collaboration	Enrichment Activities	97
Critical Thinking	Higher Order Thinking Skills	224
Creativity	Enrichment Activities	172
Social and Emotional Learning	Life Skills	45
	Text	124–127
	Case Study	221
Multiple Intelligences	Enrichment Activities	97
	Enrichment Activities	172

The NEP parameters	Features	Page nos.
Experiential/Constructivist Approach	Activity	21
	Activity	102–103
	Activity	139

The NEP parameters	Features	Page nos.
Subject Integration	Text (Agricultural Science)	1–13
	Enrichment Activities (General Awareness)	241
Art Integration	Enrichment Activities	16
	Activity	165
Health and Wellness	Life Skills	109
	Life Skills	225

## Sustainable Development Goals

A framework of 17 global goals designed to be a blueprint to achieve a better and more sustainable future for all

The NEP parameters	Features	Page nos.
Values	Life Skills	61
	Life Skills	210
Life Skills	Life Skills	157
	Life Skills	180

The NEP parameters	Features	Page nos.
Sustainable Development Goals	Text	29–30
	Case Study	129
	Text	248–251

The NEP parameters	Features	Page nos.
Know more about India	Our Heritage	17
	Our Heritage	97
	Our Heritage	173

## India Knowledge

A strong focus on ancient knowledge from India, traditional values, modern developments and future aspirations

## Digital Integration

The use of digital tools to enhance and support the teaching–learning process

### ICT/Digital resources

Orient BlackSwan Smart App - MCQ-based Quizzes for Practice and Revision

Teacher's Smart Book - Flipbook, Audio, Animations, Presentations, Picture Galleries, Interactive Activities, Embedded Questions, Worksheets with Answer Key, Games

### Teacher Empowerment

Teachers' Resource Pack - Lesson Plans with Enrichment Activities, Question Bank with Answer Key, Worksheets with Answer Key, Periodic Tests with Answer, Sample Papers for Assessment with Answers, Students' Book Answer Key

Teachers' Portal - Lesson Plans, Question Bank with Answer Key, Worksheets, Sample Assessment, Answer Key (for Exercises and Assessment Papers in the Students' Book; Worksheets and Assessment Papers in the TRP), Periodic Tests with Answer Key



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