

THE ASSOCIATION OF THE BRITISH PHARMACEUTICAL INDUSTRY

The Association of the British Pharmaceutical Industry (ABPI) represents companies in Britain that research, develop, manufacture and market prescription medicines. Britain is a world leader in pharmaceuticals, five of the world's top 25 best selling medicines were developed in the UK and over 80% of the medicines and vaccines supplied to the National Health Service are produced by ABPI member companies.

The pharmaceutical industry is constantly developing new, safer and more effective treatments for many diseases which affect people all over the world.

The Association and its member companies actively support the study of science in schools, colleges and universities by providing information on real life applications of science and technology.

BP

BP is one of the world's largest petroleum and petrochemical groups. BP's main activities are the exploration and production of crude oil and natural gas; refining, marketing, supply and transportation; and manufacturing and marketing of petrochemicals. The company is a global leader in the manufacture and use of solar photovoltaic products.

BP has well-established operations in Europe, North and South America, Australasia and Africa.

BP believes education is the key to the future – not only for business, but for society as a whole. As such, BP continues to support the partnership of business and education working together.

CHEMICAL INDUSTRY EDUCATION CENTRE

In 1988, the Chemical Industry Education Centre, CIEC, was established as a joint venture between the University of York and the Chemical Industries Association (CIA), the UK trade association for the chemical industry. It aims to enhance understanding of the chemical industry principally by providing exciting balanced science teaching and learning resources and parallel programmes of professional development for teachers and industrialists.

The CIA was born in 1965, by bringing together a trade association and an employers' federation.

Large and small chemical companies from all parts of the United Kingdom pay membership fees to CIA, whose purpose it is to support the UK chemical industry in maintaining its successful operation and development.

The University of York has an excellent international and national reputation for science education in terms of research work and curriculum developments, typified by the Salters' GCSE Science Course and the Advanced Chemistry Course.

ROYAL SOCIETY OF CHEMISTRY

The Royal Society of Chemistry is the UK Professional Body for chemical scientists and an international Learned Society for the chemical sciences with 46,000 members world-wide. It is a major international publisher of chemical information, supports the teaching of the chemical sciences at all levels and is a leader in bringing science to the public.

The RSC's object, as stated in its Royal Charter, is 'the general advancement of chemical science and its application'. Arising from this, the RSC makes a

significant effort to help teachers and students, at all levels of education, by its various activities.

There are six divisions of the RSC catering for specialist interests. The Education Division has around 4,000 members which enables chemistry teachers to be continually involved with curriculum developments and abreast of the latest teaching methods and learning aids.

There are also 35 Local Sections of the RSC which cater for the local needs of members and organise schools' lectures, careers talks and local competitions.

THE PERIODIC TABLE OF ELEMENTS

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BP

CHEMICAL INDUSTRY EDUCATION CENTRE

ROYAL SOCIETY OF CHEMISTRY

THE ASSOCIATION OF THE BRITISH PHARMACEUTICAL INDUSTRY

The Association of the British Pharmaceutical Industry (ABPI) provides paper and web based resources for teachers and students to enhance study of science, business studies and manufacturing in schools and colleges. The ABPI also provides information on careers in the pharmaceutical industry and routes into these areas of work.

Career information: www.abpi-careers.org.uk
Life enhancing careers – a career in the pharmaceutical industry.

Curriculum resources:

Interactive web resources sponsored by ABPI are available on www.schoolscience.co.uk
Information on other materials sponsored by ABPI may be obtained from:

Publications Department
ABPI, 12 Whitehall, London SW1A 2DY
Tel: 020 7930 3477
Fax: 020 7747 1411
Web: www.abpi.org.uk

BP

BP has been working with teachers for over 35 years to develop and produce educational materials about BP and its industry for schools and colleges.

The materials support the following curriculum areas:

- Science
- Citizenship
- Business studies
- Design and technology
- Geography

For further information or to order any BPES resources contact:

BP Educational Service (BPES)
PO Box 105, Rochester, Kent, ME2 4BE
BPES Helpline: +44 (0) 871 472 3020
Fax: +44 (0) 871 472 3021
Email: bpes@bp.com
Web: www.bp.com/bpes

CHEMICAL INDUSTRY EDUCATION CENTRE

The Centre:

- offers a specialist research and consultancy service to industry and schools.
- designs, publishes and distributes teaching and learning resources which illustrate industrial applications of science and technology defined by the various UK curricula and which include stimulating, interactive activities.
- contributes to public understanding of science, for example, by working with science museums and hands-on centres and by arranging interactive displays at science festivals.

- trains science and technology teachers and industrialists to use the CIEC publications and to work together effectively.

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Department of Chemistry
University of York
Heslington
York YO10 5DD
Tel: 01904 432523
Fax: 01904 434460
Email: ciec@york.ac.uk
Web: www.ciec.org.uk

ROYAL SOCIETY OF CHEMISTRY

Activities for teachers include:

- Industry Study Tours
- Symposia on the latest chemical techniques
- Summer Schools
- Management Workshops

Activities for students include:

- Chemistry at Work exhibitions
- Summer Schools
- International Chemistry Olympiad competition
- Top of the Bench competition

Available resources include:

- Careers posters, broadsheets and booklets
- Schools and Colleges Publications Service
- Curriculum materials

For further details of the ways in which the Royal Society of Chemistry can help support teaching chemistry in schools and colleges, please contact:

The Education Department
Royal Society of Chemistry
Burlington House
Piccadilly
London W1J 0BA
Tel: 020 7440 3344
Fax: 020 7287 9825
Email: education@rsc.org
Web: www.rsc.org or www.chemsoc.org/learnnet

Registered charity No. 207980

THE PERIODIC TABLE OF ELEMENTS

H
Hydrogen 1
E rocket fuel
E hydrogenation of oils to make fats
E vehicle fuel
E ammonia
A_r 1.01

He
Helium 2
E inflating balloons, airships
E leak detector, laser
E welding blanket gas
E nuclear reactor coolant
M in atmosphere for deep diving
A_r 4.00

Li
Lithium 3
E rocket fuel additive
E pacemaker battery
M aircraft material
C lubricant additive, glass
C antidepressant
A_r 6.94

Be
Beryllium 4
E x-ray tube window
M aircraft brakes
M golf clubs
M (watch) spring
M spark-free tools
A_r 9.01



RSC Advancing the Chemical Sciences



KEY

At room temperature the element is:

- Yellow** gas
- Red** liquid
- White** solid
- Green** man-made solid

Appearance in nature:

- Unshaded** only as compounds
- Shaded** free element
- Half-shaded** as the element and in compounds

Used as:

Calcium 20
E water and air purification
E tyre colourant, in steel
E diamond, pencil
E glasses, fibres
C natural gas, petrol, oil
A_r 12.01

name, atomic number
element (text in black)
alloy, blend or mixture (text in red)
compound (text in dark blue)
relative atomic mass (to 2 d.p.)

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Na
Sodium 11
E coolant in nuclear reactors
M street light
C kitchen salt, soda, glass
C airbag
C cosmetics, soap
A_r 23.00

Mg
Magnesium 12
E flare
M car wheel, aircraft
C firebrick
E powder for gymnasts
C cement, filler
A_r 24.31

K
Potassium 19
C synthetic fertilizer
C glasses, lenses
C matches, gunpowder
C salt (sodium chloride) substitute
A_r 39.10

Ca
Calcium 20
E metallurgy
M cable insulation, battery
C synthetic fertilizer, salt treatment for icy roads
C plaster, cement
C filler in paper, paint
A_r 40.01

Sc
Scandium 21
E leak detector
C seed germinating agent
C lights for sets for TV productions
A_r 44.96

Ti
Titanium 22
E heat exchanger
M aircraft
M bone pin, prosthesis
C pigment for paint and paper
C catalyst for sulfuric acid production
A_r 47.88

V
Vanadium 23
M construction material
M tools, spring
C synthetic fertilizer
C anti-rust paint
C catalyst for sulfuric acid production
A_r 50.94

Cr
Chromium 24
E plating, protecting
M steel for tools and knives
C catalyst for methanol production
C camouflage paint, laser
C cassette and video-tapes
A_r 52.00

Mn
Manganese 25
M steel for railway points
M tools, axes
M safe
C battery
C glass, black pigment
A_r 54.94

Fe
Iron 26
E magnet
M bridge, car, boat, machine
M 'tin' can
M tools, nail
A_r 55.85

Co
Cobalt 27
E gamma radiation source
M razor blades
M permanent magnet
C pigment
A_r 58.93

Ni
Nickel 28
E coins
E catalyst for hydrogenation
M 'white' gold, crucible
C nickel plating
C rechargeable battery
A_r 58.69

Cu
Copper 29
E wire, cable, printing
M bronze, sculpture
M brass
M coin, tube, tap
M pipe, slip, propeller
M ball
A_r 63.55

Zn
Zinc 30
E corrosion resistant coating (galvanising)
E battery, gutter
M car parts, brass
C cosmetics
C white pigment in rubber
A_r 65.39

Ga
Gallium 31
E quartz thermometer
C light emitting diode (LED)
C TV screen
C transistor, tumour locator
C infra-red detector
A_r 69.72

Ge
Germanium 32
E infra-red optics
E reflector in projector
E transistor diode
H solar cells
A_r 72.61

As
Arsenic 33
E laser printer
C wood protection
C glass
C light emitting diode (LED)
A_r 74.92

Se
Selenium 34
E light meter
E photocopier
C infra-red optics
C colouring glass
C anti-dandruff shampoo
A_r 78.96

Br
Bromine 35
C tear gas
C flame retardant
C pharmaceuticals
C photographic paper, film
A_r 79.90

Kr
Krypton 36
E fluorescent tube
E gas discharge tube
E gas for leak tester
E weight standard
C UV laser
A_r 83.80

Rb
Rubidium 37
E photoelectric cell
E gas scavenger (in vacuum tube)
C fuel cell
C hardened glass
C blood circulation regulator
A_r 85.47

Sr
Strontium 38
C nuclear battery in buoys & weather stations
C permanent magnet
C phosphorescent paint
C fireworks
C toothpaste for sensitive teeth
A_r 87.62

Y
Yttrium 39
M jet engine
M telephone relay
C camera lenses
C firebricks
C laser, radar (filter)
A_r 88.91

Zr
Zirconium 40
E nuclear fuel rods
M percussion cap
C fake diamond
C furnace bricks
C oxygen meter
A_r 91.22

Nb
Niobium 41
M cutting tools
M electrical relay
M superconducting magnet
M welding rod
M orthopedic implants
A_r 92.91

Mo
Molybdenum 42
E filament in electric heater
M electrical motor, turbine
C flame retardant
C lubricant
C catalyst in petrochemistry
A_r 95.94

Tc
Technetium 43
E radiation source for medical research
A_r (98)

Ru
Ruthenium 44
M car spark plug
M electrical contact
M rocket motor, turbine
C flame retardant
M spinning wire
M jewellery
A_r 101.07

Rh
Rhodium 45
E mirror in projector
M telephone relay
M jewellery
M catalytic converter
M aircraft spark plug
A_r 102.91

Pd
Palladium 46
E catalytic converter
E hydrogen absorption and storage
M dental crowns
M dental plating
M jewellery
A_r 106.42

Ag
Silver 47
E mirror, battery
M coins, jewellery
M silverware
C photographic paper, film
C photoresistive glass
A_r 107.87

Cd
Cadmium 48
E rechargeable battery
M control rods in nuclear reactor
C light meter
C pigment in enamel, ceramic and oil paint
A_r 112.41

In
Indium 49
E solar cell
M car bearings
M motor in grand prix car
C glass coating
A_r 114.82

Sn
Tin 50
M tin can, solder, coin
M bronze
M organ pipe
C anti-rust paint
C opalescent glass, enamel
A_r 118.71

Sb
Antimony 51
M solder
M lead battery, bearings
M resistance wire
C fire retardant
C infra-red detector
A_r 121.75

Te
Tellurium 52
E percussion cap
M steel for work on lathes
M resistance wire
C vulcanization of rubber
A_r 127.60

I
Iodine 53
E disinfectant
E treatment of thyroid cancer
E halogen lamp
C X-ray diagnosis
C salt additive, prevention of goitre
A_r 126.90

Xe
Xenon 54
E UV lamp, sun lamp
E car lamp
E lamp for projector
E electronic indicator
E UV laser
A_r 131.29

Cs
Caesium 55
E photoelectric cell
E gamma radiation source
E atomic clock
E infra-red lamp
E rocket fuel additive
A_r 132.91

Ba
Barium 56
M gas scavenger (in vacuum tube)
C lubricant additive
C catalyst for paper
C fireworks, X-ray photo of digestive system
M used seed in oil drilling
A_r 137.33

La
Lanthanum 57
M lighter flint
M battery electrode
C catalytic converter
C camera lenses
A_r 138.91

Hf
Hafnium 72
E nuclear submarine
E control rods in nuclear reactor
E gas scavenger for vacuum tube
M jet engine
M tools
A_r 178.49

Ta
Tantalum 73
E electrical condenser
M vacuum tube filaments
M cutting tool, rocket
M spectacle frames, prosthesis
C camera lenses
A_r 180.95

W
Tungsten 74
E welding electrode
E lamp filament, tv
M armour, shell, bullet
M rocket nozzle
M cutting and boring tools
A_r 183.85

Re
Rhenium 75
E oven filament
M catalyst 4-star petrol production
M jewellery plating
M anode X-ray tube
M thermocouple
A_r 186.21

Os
Osmium 76
E catalyst for ammonia production
M fountain pen nib
M compass needle
M clock bearing
M jewellery
A_r 190.2

Ir
Iridium 77
E cancer irradiation
M hypodermic needle
M helicopter spark plug
C fountain pen nib
A_r 192.22

Pt
Platinum 78
E catalyst for nitric acid production
M crucible
M melting pot for glass, jewellery
M dental crown
M anti-tumour agent
A_r 195.08

Au
Gold 79
E precious metal
E jewellery
E electrical contact
M dental crown
C rhizomatism treatment
A_r 196.97

Hg
Mercury 80
E thermometer
E street light
E sun lamp, energy-saving bulb
M dental filling
A_r 200.59

Tl
Thallium 81
M thermometer filling
C low melting glass
C infra-red detector
C infra-red camera lenses
A_r 204.38

Pb
Lead 82
E radiation protection
M roof covering, battery
M solder, ammunition
C red lead paint
C crystal glass
A_r 207.2

Bi
Bismuth 83
M fusible
M sprinkler, shotgun pellet
C glass, ceramic
C burn dressing
C cosmetics
A_r 208.98

Po
Polonium 84
E nuclear battery
E neutron source
A_r (209)

At
Astatine 85
Seldom found in nature
A_r (210)

Rn
Radon 86
E earthquake predictor
A_r (222)

Fr
Francium 87
Seldom found in nature
A_r (223)

Ra
Radium 88
A_r 226.03

Ac
Actinium 89
A_r 227.03

Rutherfordium 104
Dubnium 105
Seaborgium 106
Bohrium 107
Hassium 108
Meitnerium 109
Darmstadtium 110
Roentgenium 111

Ce: Cerium 58
M lighter flint
C colouring for TV glass
C arc lamp
A_r 140.12

Pr: Praseodymium 59
M lighter flint
M permanent magnet
C searchlight
C ceramic colouring
C glass for welding spectacles
A_r 140.91

Nd: Neodymium 60
M permanent magnet
C colouring for spectacles
C ceramic condenser
C glass for laser and lenses
A_r 144.24

Pm: Promethium 61
C nuclear battery
C thickness meter
A_r (145)

Sm: Samarium 62
M permanent magnet
M neutron scavenger
C meser
C ceramic condenser
A_r 150.36

Eu: Europium 63
M neutron scavenger
C colour tv tube
C x-ray screen
A_r 151.96

Gd: Gadolinium 64
M chromium steel
M optical memory
M permanent magnet
C x-ray tube
C computer memory
A_r 157.25

Tb: Terbium 65
C x-ray screen
C fluorescent lamp
C laser
A_r 158.93

Dy: Dysprosium 66
M aircraft metal
M optical memory
M permanent magnet
C x-ray tube
C computer memory
A_r 162.50

Ho: Holmium 67
C laser
C glass colouring
A_r 164.93

Er: Erbium 68
E infra-red absorbing glass
M vanadium steel
C glass colouring
A_r 167.26

Tm: Thulium 69
E x-ray equipment
C pigment for TV screen
C microwave
A_r 168.93

Yb: Ytterbium 70
M stainless steel
C transistor diode
A_r 173.04

Lu: Lutetium 71
A_r 174.97

Th: Thorium 90
E coating on filament wire
E nuclear reactor fuel
C glass for lenses
C gaslight mantle
C glass colouring
A_r 232.04

Pa: Protactinium 91
A_r 231.04

U: Uranium 92
E 'breeder' reactor fuel
E nuclear reactor fuel
M gyro compass
M tank ammunition
C glass colouring
A_r 238.03

Np: Neptunium 93
A_r 237.05

Pu: Plutonium 94
C nuclear battery for space research
C nuclear reactor fuel
A_r (244)

Am: Americium 95
C crystal research
C smoke detector
C glass thickness meter
C neutron source
A_r (243)

Cm: Curium 96
E radiation source
A_r (247)

Bk: Berkelium 97
A_r (247)

Cf: Californium 98
C neutron source
A_r (251)

Es: Einsteinium 99
A_r (252)

Fm: Fermium 100
A_r (257)

Md: Mendeleevium 101
A_r (258)

No: Nobelium 102
A_r (259)

Lr: Lawrencium 103
A_r (260)