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What on Earth is the Greenhouse effect?	Concepts of greenhouse effect and role of carbon dioxide		Ian Campbell	1	2
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Heating under reflux	Quick fit apparatus	Lab page	Maria Turkenburg & Isaac Bruce	20	2
Magnetic Marvel	Nuclear magnetic resonance (NMR), magnetic resonance imaging (MRI), body scanning, spin states, protons	In pictures	Ross Jagers	20	2
Kwolek: Creator of Kevlar	Condensation reactions, polymerisation, hydrogen bonding, functional groups, polyamide, aramid cis-trans-isomerism	Scientists of substances	Gill Wroe	20	2
Kevlar and composites	Polymers, hydrogen bonds, fibre reinforced polymer composites, carbon fibres, thermoplastic, thermosetting, aramid, resins, glass fibre, injection moulding, vacuum farming	Focus on industry	Gill Wroe and CIEC team	20	2
Calculations	Mole concept, rates of reactions, equations, volumetric analysis, enthalpy changes, pH, bond enthalpy, weak acids, radiation energy, solubility product, Born-Haber cycles	Answer back	David Billett	20	2
Science beats food fraud	Forensic techniques, isotopic ratio, isotopes	Back page	Michael Morgan-Williams	20	2
Self-healing polymers	Polymers, composite materials, alkene, diene, monomer, equilibrium resin, polymer matrix, Diels-Alder reaction, thermoset polymer		Elliot Fleet	20	3
Calcium carbonate	Polymorphic material, minerals, equilibrium, solubility, Le Chatelier's principle, metamorphic rock, sedimentary rock, igneous rock, water hardness, travertine, tufa, carbonatites, limestone, chalk, dolomite, marble	Substances	Gill Wroe	20	3
Benerito: The chemist who banished ironing	Polymer, hydrogen bonds, cellulose, cotton, triglycerides, amines, Lewis acid, mercerisation	Scientists of substance	Gill Wroe	20	3

Poison in the air: atmospheric carbon monoxide	Free radical, oxidative capacity, atmospheric chemistry, photochemistry, gas chromatography, atomic absorption	Out of thin air	Aoife Grant & Tim Harrison	20	3
Cutting-edge chemistry	Metals, polymers, tollens, reagent, printed circuit boards, silver mirror, photoelectric effect, L-DOPA aldehydes, infrared spectroscopy, X-ray photoelectron spectroscopy (XPS), van der Waals forces, addition reactions, dative bonds, nucleophiles, dopamine	Encounter	Megan Bowdrey	20	3
Catalysis: getting chemistry going	Activation enthalpy (activation energy), homogeneous and heterogeneous catalysts, equilibrium, enzymes, green chemistry, Monsanto process, industrial processes, catalytic converters, supported catalysts		James Naughton	20	3
Transition metal riddles	Transition metals	Making and doing	Alan Reay	20	3
Feeling the heat	Cool packs, heat packs, cryotherapy, enthalpy changes, ionic solid, endothermic & exothermic processes, solvation	Back page	Ross Jagers	20	3
The chemistry of hangovers	Ethanol, neurotransmitters, hormones, electrolytes, enzymes, metabolism, ATP & ADP, pyruvate, oxidation & reduction, NADH		Pavel Guzanov	20	4
What comes out of your kettle	Intermolecular forces, covalent bonding, physical and chemical changes, melting, boiling & sublimation, separation of oil fractions, periodicity, electronegativity, molecules and macromolecular structures, van der Waals forces, ionic compounds	Answer back	Graham Curtis	20	4
Bleaching and dyeing: Chemical change in hair fibres	Redox reactions, polymers, melanin, hair dyes, nucleophilic & condensation reactions, hair structure, keratin, radicals		Kazim Raza Naqvi	20	4

Do ants destroy the ozone layer?	Halogenoalkanes, free radicals, catalysis, gas chromatography, mass spectrometry, halocarbons, atmospheric chemistry, leaf cutter ants, photolabile	Out of thin air	Tim Harrison, Anwar Khan & Dudley Shallcross	20	4
Water water everywhere	Molecular structure/shape electronegativity, polarity, hydrogen bonding, density, viscosity, surface tension, buffer, photosynthesis, temperature regulation	Substances	Nicola Davis	20	4
To err is scientific	Errors, units, measurement, mass probability, confidence intervals, standards	How science works	Mary Wood	20	4
ChemSpider	Enantiomer, chirality, infrared spectroscopy, NMR, structure, synthetic chemistry, RSC	Chemistry on the web	Mary Wood	20	4
A Healthy, Wealthy, Sustainable World-John Emsley	Organic farming, chemistry food and medicine, swimming pools, zolpidem, organochlorines, cholera	Worth reading	Emma Dux	20	4
Polymers, plastics and superglue	Adhesive, monomer, activation, initiator, living polymerisation, termination	Back page	Ross Jagers	20	4
Body oddities: the chemical reactions of eating	Onions, allinases, asparagus, sulfur compounds, spinach, potatoes, solanine, gas chromatography-mass spectrometry		Joanna Buckley	21	1
Polymers and tulips: a year in industry	Student, year in industry, chemistry degree, polymers, Ziegler-Natta catalysis	Encounter	Mary Wood	21	1
Cuppa chemistry	Tea, aromatic compounds, polyphenols, free radicals, caffeine	What's your poison?	Emma Dux	21	1
Cracking concrete heals itself	Concrete, greenhouse gas	Wonders of chemistry	Gill Wroe	21	1
Lasers in chemistry	Lasers, absorption of light, global warming	Stretch and challenge	Mike Ashfold, Andrew Orr-Ewing & Tim Harrison	21	1
It ain't what you do (it's the way you do it)	Organic reaction mechanisms, reaction conditions	Answer back	Graham Curtis	21	1

Calcium carbonate (CaCO <sub>3</sub> )	Calcium carbonate, limestone, lime, construction industry, cement, environment, pollution, agriculture, quicklime, hydrated lime	Focus on industry	Allan Clements, CIEC team	21	1
The Elements – A Very Short Introduction	Philip Ball, periodic table, gold	Worth reading	Anne Hodgson	21	1
Gecko glue	Adhesion, van der Waals forces, electrostatic bonds, intermolecular interaction	Back page	Alex Pashley	21	1
Good vibrations: infrared spectroscopy	Infrared spectroscopy, analytical techniques, light	Stretch and challenge	James Naughton	21	2
Marie Curie: probing the atom	Marie Curie, radioactivity, radiation	Scientists of substance	Mary Wood	21	2
Infrared spectrometers	Infrared spectrometer, spectra	Lab page	James Naughton	21	2
Structure and spectroscopy	Infrared spectroscopy, NMR spectroscopy, structure, isomerism	Answer back	David Billett	21	2
Nature's Building Blocks (2 <sup>nd</sup> edition)	John Emsley	Worth reading	Anne Hodgson	21	2
AAAS Conference	American Association for the Advancement of Science conference, AAAS	Encounter	Samuel Andrew	21	2
Iridium: life-saving transition element	Iridium, transition metal, Smithson Tennant, phosphorescence, pH changes	Substances	David Lewis	21	2
Chemistry of wine	Wine, esters, polymerisation, grape juice, <i>cis/trans</i> isomerisation of alkenes, flavonols	What's your poison?	Emma Dux	21	2
Arsenic poisoning	Arsenic, toxicity, carcinogen		Magdalena Wajrak	21	2
Chemistree: food dyes	Food dyes, aromatic rings, conjugated systems	Back page	Emma Dux & Julia Walton	21	2
Would aliens need water?	Free radicals, hydrothermal vents, hydrocarbons, methanogens, photosynthesis, Titan		Daniel Went	21	3
Cocaine: atoms of addiction	Cocaine, tertiary amine	Substances	Amelia Dearman	21	3

Biochemistry, brewing and beery scientists	Beer, brewing, fermentation, saccharification, titrations, enzymes, thermodynamics, isomerism, biochemical processes, pasteurisation	What's your poison?	Nigel Lowe	21	3
Solid foundations: part 1	Atomic orbital arrangements, covalent bonding, covalent network structures, hydrogen bonding, molecular shape	Revision note	Nicola Davis	21	3
Chemistry of the cosmos	Space, cosmos, interstellar medium, Saturn, Titan, Venus, asteroids	In pictures	Alex Pashley	21	3
Beads of time: analysing our past	Glass beads, archaeology, Iron Age, laser ablation, stratigraphic dating, quadrupole mass analyser, mass spectrometry		Martina Bertini	21	3
Folic acid	Folic acid, acidity, pH calculations, buffers, conjugate acids and bases, hydration of ions, intermolecular forces, skeletal formulae, optical isomerism, enthalpy cycles	Answer back	Maurice Carmody	21	3
Biotechnology	Fermentation, biotechnology, citric acid, lactic acid, propane-1,3-diol, amino acids. L-glutamic acid, L-lysine	Focus on industry	Allan Clements, CIEC team	21	3
Perilous poisons	Poison, ricin, Georgi Markov, Alexander Litvinenko, polonium	Back page	Ross Jagers	21	3
Drugs in sport: how chemistry can beat the cheats	Drugs, sport, detection, anabolic steroids, testosterone, gas chromatography, mass spectrometry, liquid chromatography, GC-MS, erythropoietin, Olympics		John Emsley	21	4
Flame tests and emission spectra	Flame test, emission and absorption spectra, atomic structure, spectroscopy	Lab page	Kristie Pickersgill	21	4
Cisplatin: from accidental discovery to wonder drug	Cis-trans isomerism, ligands, oxidation states, DNA structure, cisplatin		Emma Dux	21	4
Build your own spectroscopy	Spectroscopy, emission spectra	Making and doing	Kristie Pickersgill	21	4
A mug of coffee and chemistry	Coffee, aromatic compounds, zwitterions, trionelline	What's your poison?	Emma Dux	21	4



Solid foundations: part 2	Ionic bonding, giant ion lattices, electron configuration, metallic bonding, metallic lattices	Revision note	Nicola Davis & Gill Wroe	21	4
Aerogel: 'frozen smoke'	Phase diagrams, supercritical fluids, super-insulators	Substances	Michael Nolan	21	4
Molecules with Silly or Unusual Names	Paul W. May, Olympiadane, performic acid, periodic acid, megaphone, moronic acid, curious and titanic chloride, windowpane, angelic acid, warfarin	Worth reading	Anne Hodgson	21	4
The smell of success	Robotic smell. Electronic nose	Back page	Ross Jagers	21	4
In search of the perfect chocolate bar	Chocolate, cocoa butter, triglycerides, synchrotron X-ray diffraction, flavour, phenylethylamine		Mary Wood	22	1
Controversial chlorine	Chlorine, halogens, oxidation number, formulae, half-equations, mole calculations, electron configurations	Answer back	Maurice Carmody	22	1
Applications in agriculture: fertilisers	Fertilisers, agriculture, nutrients, nitrogen, phosphorous, potassium, sulphur	Focus on industry	Allan Clements, CIEC team	22	1
Decoding skeletal secrets	Isotopic analysis, mass spectrometry, bones, collagen, Tutankhamun, Ötzi	In pictures	Phillip Chivers	22	1
Summing up fertilisers	Relative atomic mass, relative formula mass	Making and doing	Gill Wroe & Anne Hodgson	22	1
Chemistry's calling: mobile phones and touchscreen technology	Mobile phones, touchscreen technology lithium ion cells. LCDs, aluminosilicate glass screens, oleophobic coatings	Lifestyle chemistry	Alex Pashley & Nicholas Bissett	22	1
A different type of drug	Proteins, pharmaceutical chemistry, Andy Hamilton, patents		Martin Christlieb	22	1
The fascinating Fenton reaction	Henry Fenton, waste-water treatment, oxidation reactions, reduction reactions, radicals, catalysis, transition metal oxidation states	Scientists of substance	Kazim Raza Naqvi	22	1
How hot is your chemistry?	Capsaicin, chilli peppers, Scoville scale	Back page	Alyssia Kaczmarczyk	22	1

The sky's no limit: polymers, planes and solar sails	Polymers, covalent bonds, polymerisation, thermosetting, aviation industry, composite materials, fibreglass		Alex Pashley	22	2
Chemistry from a natural product	Organic reactions, mechanisms, formulae, structure, isomerism, nomenclature, polymerisation, hydrogen bonding, solubility	Answer back	David Billett	22	2
Breakthroughs in green chemistry: magnetic detergents and supercritical CO <sub>2</sub>	Soap, magnetic detergents, supercritical CO <sub>2</sub> , solvent, dry-cleaning		Tim Harrison & Julian Eastoe	22	2
Tetrodotoxin: famously deadly poison	Tetrodotoxin, pufferfish, fugu	Substances	Emma Dux	22	2
Recrystallisation	Recrystallisation, Buchner filtration	Lab page	Emma Dux	22	2
Applications in agriculture: fungicides	Fungicides, agriculture, Strobilurins, carboxamides, downy mildews	Focus on industry	Allan Clements, CIEC team	22	2
Breverton's Encyclopedia of Inventions	Terry Breverton, inventions	Worth reading	Anne Hodgson	22	2
Curried chemistry	Curry, chillies, capsaicinoids, ginger, turmeric, garlic, onion	Lifestyle chemistry	Emma Dux & David Smith	22	2
Molybdenite Valley?	Semiconductors, molybdenite, silicon	Wonders of chemistry	Sergio Saris	22	2
Rat wars	Rodenticides, rats, anticoagulants, superwarfarins, brodifacoum, metal phosphides, calciferols	Back page	Gill Wroe	22	2
Traditional Chinese medicine: what can we learn from it?	TCM, medicine, aspirin, esterification, artemisinin, placebo effect		Michael Nolan	22	3
Two in one: the chemistry of shampoo and conditioner	Hair, shampoo, conditioner, soap, surfactants, cations, anions, polymers, silicones	Lifestyle chemistry	Emma Dux	22	3
All things ice	Water, ice, hydrogen bond, phase diagram, polymorphism, triple point	Substances	Alex Pashley	22	3
Determining the yield of a reaction	Synthetic reaction yield	Lab page	Emma Dux	22	3

A bright future for MRI	MRI spectroscopy, parahydrogen, hyperpolarisation, Signal Amplification By Reversible Exchange, SABRE, purines, pyrimidines, dynamic nuclear polarisation, DNP		Louise Highton	22	3
Tricky transition metals	Electron configurations, transition metals, complexes, ligands, Lewis acids and bases, catalysis, entropy	Answer back	Mary Hoyle	22	3
Applications in agriculture: herbicides	Herbicides, agriculture, bipyridyliums, auxins, glycines, sulfonylureas, triketones, inhibitors of acetyl-CoA carboxylase	Focus on industry	Allan Clements, CIEC team	22	3
Making use of electrode potentials	Electrode potentials, reactivity series, redox reactions, oxidation number, oxidising agents	Top tips	Andrew Crookell	22	3
You can't beat beetroot	Beetroot, diet, nitrate, nitric oxide	Back page	Laura Turkenburg	22	3
Buried with their bones	Chromatography, lipids, triacylglycerols, biomarkers, grave goods, micromorphology, burial, pig burial		Kimberley Green	22	4
Applications in agriculture: insecticides	Functional groups, pests, insecticides, agriculture, organophosphorous compounds, methyl carbamates, macrocyclic lactones, phenylpyrazoles, nereistoxin, neonicotinoids, diamides, pyrethroids, benzoylureas, ketoenols	Focus on industry	Allan Clements, CIEC team	22	4
Shades of chemistry	UV radiation, radicals, electromagnetic spectrum, polymers, sunglasses, photochemical reaction, photoisomerism	Lifestyle chemistry	Alex Pashley	22	4
Kevlar: miracle material	Kevlar, polymers, hydrogen bonding	In pictures	Heather Powell	22	4
Fragments: the future of pharmaceuticals	Drug design, pharmaceutical chemistry, fragments, X-ray crystallography		Sean McKenna	22	4
Tackling stretch and challenge questions	Interpretation of data, organic reactions	Revision note	Maurice Carmody	22	4

Patents: protecting your ideas	Patents, drugs, blockbusters	How science works	Tony McStea	22	4
SeXeY chemistry	Elements, periodic table, atomic number, electron configuration, allotropes, isotopes, selenium, xenon, yttrium	Encounter	Gill Wroe	22	4
Celebrating the double helix	DNA, James Watson, Francis Crick, hydrogen bonds, mutations	Back page	Anne Hodgson	22	4
Flying sources bring transition metals	Transition metals, periodic table, resources, oxidation state, electronic transitions, asteroids, hall electrolysis process, hydrothermal vents, nodules, panning, spectroscopy		Tony Hargreaves	23	1
Artificial photosynthesis: putting sunshine in the tank	Catalysis, climate change, fuels, oxides of carbon, energy, reduction, biofuels, solar fuel, artificial photosynthesis, Monsanto process, porphyrin	Greener and cleaner	Christopher Windle	23	1
Planning for success in extended-answer questions	Bonding, structure, physical properties, intermolecular forces, alkanes, alkenes, stereoisomerism, analysis of data	Answer back	Mike Wooster	23	1
Iodine in medicine	Iodine, halogen, thyroid hormones, beta decay, glycogen, half-life, iodometry, isotope, metastases, oxidising agent, goitre	Substances	Laura Turkenburg	23	1
Hair-raising chemistry	Hair, colour, pigments, eumelanin, pheomelanin, melanin	In pictures	Elizabeth Brookes	23	1
Chemical conundrum		Making and doing	Anne Hodgson	23	1
Cracking the egg timer: Dating ancient eggshells with amino acids	Liquid chromatography, mass spectrometry, amino acid racemisation, chirality, enantiomers, optical isomers, ostrich eggshells, biominerals, geochronology, hydrolysis, radiocarbon dating, sub-fossils, thermal age, archaeology		Molly Crisp	23	1

Catalysis: heterogeneous catalysis	Catalysts, activation energy, industrial chemistry, heterogeneous catalysis, homogeneous catalysis, ters	Focus on industry	Allan Clements, CIEC team	23	1
Henry Moseley: understanding atomic numbers	Henry Moseley, atomic number, atomic structure, periodicity, periodic table	100 years ago...	Bruce Gilbert	23	1
Hydrogen fuel cells: harnessing explosive energy	Hydrogen fuel cell, HFC	Back page	Mark Dowsett	23	1
pH goes viral	Virus, pH, protein formation, amino acid, hydrolysis, condensation reaction, endocytosis, enzyme, endosome proton pump		Lucy Robinson	23	2
Reclaiming plastic waste	Polymers, recycling, plastic, PET, depolymerisation	Greener and cleaner	Emma Dux	23	2
Performing the perfect titration	Titration, titrant	Lab page	Lee McManus	23	2
Won't you step into my parlour...spider silk	Polymers, materials chemistry, hydrogen bonding, spider silk	Wonders of chemistry	Sam Black	23	2
Atropine: a bitter pill to swallow	Atropine, chirality, enantiomers, racemisation, poison, castor oil plant, ricin, deadly nightshade		Joanna Buckley	23	2
Applications of heterogeneous catalyts	Heterogeneous catalysts, reaction mechanisms, molecular structure, isomers, zeolites, contact process, sulfuric acid, aluminium oxide, aluminosilicates, activation energy	Focus on industry	Allan Clements, CIEC team	23	2
Niels Bohr and atomic structure	Niels Bohr, atomic structure	100 years ago...	Alyssia Kaczmarczyk	23	2
Making alkenes: the Wittig reaction	Alkenes, <i>E/Z</i> stereoisomerism, reaction mechanisms, curly arrows, nucleophilic substitution reaction	How science works	Alex Pashley	23	2
Burning blue	Pyrotechnics, fireworks, blue flame	Back page	Alex Pagett	23	2

Extremophiles: surviving salt and space	Extremophile, amino acids, proteins, concentration, molarity, pH, halophile, osmosis, atomic force microscopy, biotechnology		Danielle Walsh, Lorna Dougan	23	3
What can we make from carbon dioxide?	Carbon dioxide, catalysis, enzymes, nucleophilic reactions, polymer production, aspirin, Gibbs free energy of reaction, Calvin cycle	Greener and cleaner	Emma Dux	23	3
Absinthe: lessons from the green fairy	Formulae, geometric isomerism, functional groups, electrophilic addition, polymerisation	Answer back	David Billett	23	3
Red dread: the chemistry of a clean-up	Oxidation states, aluminium extraction, pH, minerals and ores, amphoteric oxide, pollution, Hall-Héroult process, red mud		Mark Hodson	23	3
Catalysis: homogeneous catalysts	Homogeneous catalysis, reaction mechanisms, polymerisation, molecular structure, stereochemistry, Ziegler-Natta catalyst, metallocene catalyst	Focus on industry	Allan Clements, CIEC team	23	3
Magnesium	Magnesium, group 2, organic synthesis, enzymes, reactivity series, chlorophyll, Calvin cycle, Grignard reagent, ATP, cytochrome, NADPH	Substances	Emma Dux	23	3
30-Second Elements	Eric Scerri, polonium, silver, sulfur, arsenic	Worth reading	Anne Hodgson	23	3
Steam distillation	Steam distillation, ideal gas equation, vapour pressure	Lab page	Ingo Fengler	23	3
Feeling blue: lobster rarities	Lobster, astaxanthin, conjugated bonds, genetic mutation, alpha-crustacyanin	Back page	Mark Dowsett	23	3
Sniffing out carbonyl compounds	Aldehydes, ketones, Tollens' reagent, addition reactions. Silver mirror test.		Simon Cotton	23	4

Copper sulfate and ammonia: stretch and challenge question	Mole calculations, acid–base titrations, acid–base indicators, titration curves, complex ions, practical quantitative chemistry	Revision note	Maurice Carmody	23	4
Molecules of revision	Neurotransmitters, hormones, dopamine, serotonin, epinephrine, adrenaline, norepinephrine, endorphins, oxytocin	Wonders of chemistry	Mark Dowsett	23	4
How can a chemistry degree prepare you for a job?	University, employability skills, transferable skills	Careers in chemistry	Andrew Parsons and Katrina Sayer	23	4
Careers for chemists	Chemistry careers	Careers in chemistry	Andrew Parsons and Katrina Sayer	23	4
Fighting forgery with forensics	Paper, ink, chromatography, spectroscopy, dyes and pigments, Harold Shipman, Hitler diaries		Tony Hargreaves	23	4
Food waste: beyond the bin	Green chemistry, sustainability, EUBIS, orange peel, limonene, pectin, bioethanol	Encounter	Katie Privett	23	4
Biocatalysis in biosolvents	Catalysis, enzymes, green chemistry, industrial chemistry, solvents, industrial waste disposal, hydrolysis, condensation reaction, ester formation, Le Chatelier's principle, biofuel, biomass	Greener and cleaner	Giulia Paggiola	23	4
Looking into glass	Glass, salt structure, giant ionic lattice, giant covalent structure, crystal structures and shapes	Substances	Andy Connelly	23	4
Envirocrew.org: sustainability works	Sustainability	Chemistry online	Sorina Antonescu	23	4
Super foods	Antioxidants, free radicals	Back page	Taylor Harrison	23	4
Living on Mars	Electrolysis, polymers, plastics, catalysis, space, Mars, Sabatier reaction		Christina Briggs	24	1
Graphene and carbon nanotubes	Graphene, carbon nanotubes, bucky tubes, nanotechnology	Wonders of chemistry	Emma Kastrisianaki-Guyton	24	1
Elementary clues	Puzzle	Making and doing	Annie Hodgson	24	1

Dealing with CO <sub>2</sub> : from carbon sinks to sequestration	Fossil fuels, atmospheric chemistry, greenhouse gases, carbon dioxide, CO <sub>2</sub> , carbon sink, carbon source, photosynthesis, carbon capture, carbon sequestration		Sorina Antonescu	24	1
The life of a first-year chemistry student	University, studying chemistry	Encounter	Sam Edwards	24	1
Developing and delivering drugs	Medicines, drug development, drug delivery, penicillin, antibiotic resistance, antiviral drugs, anti-cancer drugs	Chemistry in medicine	Emma Dux	24	1
Biotechnology in the chemical industry: biodegradable polymers	Biodegradable polymers, green chemistry, fossil fuels, PHA, PHB, PLA, starch	Focus on industry	Allan Clements, CIEC team	24	1
Alkenes and clean screens	Organic nomenclature, alkenes, alcohols, E/Z isomerism, skeletal formulae	Answer back	Maurice Carmody	24	1
Follicle forensics	Analytical chemistry, forensics, hair, chromatography, spectrometry	Back page	Hannah Felstead	24	1
Spotlight on mercury	Mercury, d block, gold mining, poisoning, acids and bases		Simon Cotton	24	2
The jeans that eat pollution	Pollution, jeans, catalysis, atmospheric chemistry, acid rain, laundry	Wonders of chemistry	Katy Hollies	24	2
Biotechnology in the chemical industry: biofuels	Biofuels, biodiesel, esters, fermentation	Focus on industry	Allan Clements, CIEC team	24	2
Getting drugs to where they're needed	Cancer, drug delivery, chemotherapy, polymers, proteins		Gemma Lambert	24	2
Hess cycles and the MASK check	Hess' law, Hess cycles, enthalpy,	Top tips	Andrew Crookell	24	2
Mind-numbing drugs	General anaesthetics, local anaesthetics, nitrous oxide, ether, chloroform, halothane, cocaine, procaine, lidocaine, curare, tubocurarine, gallimine	Chemistry in medicine	Emma Dux	24	2
Chemword	Crossword puzzle	Making and doing	Anne Hodgson	24	2
Every Molecule Tells a Story	Simon Cotton, morphine, heroin, endorphin, opium poppy, codeine	Worth reading	Anne Hodgson	24	2



Cracking down on chemical weapons	Chemical weapons, sarin	Back page	Sam Edwards	24	2
Earth's solar potential	Solar power, green chemistry, photovoltaic effect, polymers, graphene		Chris Unsworth	24	3
Lyotropic liquid crystals: essential for life	Surfactants, micelles, lyotropic liquid crystals, washing up, Kevlar	Wonders of chemistry	Saleesh Kumar Nambalan Sivaraman	24	3
Fighting mental illness	Mental illness, depression, antidepressants, iproniazid, tricyclics, SSRI, SNRI, Prozac	Chemistry in medicine	Emma Dux	24	3
Chromatography	Paper chromatography, TLC, HPLC, GC	Lab page	Anne Hodgson	24	3
Examining equilibrium	Equilibrium, calculations	Answer back	David Billett	24	3
Preserving the past	Conservation, acids, carbonates, erosion, pollution, acid rain, stone, limestone, fatty acids		Mark Hodson	24	3
Recent advances in biofuel production	Biofuel, green chemistry, industrial chemistry	Focus on industry	Allan Clements, CIEC team	24	3
Three years or four? Completing a chemistry degree	University, studying chemistry,	Encounter	Alex Pashley	24	3
Wake up and smell the coffee	Coffee, adenosine, caffeine, decaffeination	Back page	Sam Edwards	24	3
Photoactivated platinum compounds for cancer therapy	Platinum, cancer therapy, cisplatin, tumours, clinical trials		Louise Tear	24	4
Biorefineries	Biorefineries, fermentation, thermochemical processing, gasification, pyrolysis, isomerisation, reforming	Focus on industry	Allan Clements, CIEC team	24	4
Improving natural medicines	Aspirin, penicillin, semisynthesis, tetracyclines, antibiotics, artemisinin, taxol		Simon Cotton	24	4
Picture it...Chemistry	Plants, capsaicin, vanillin, raspberry ketone	Chemistry online	Natalie Fey and Jenny Slaughter	24	4
Nuclear Magnetic Resonance	NMR, spectroscopy, emission and absorption spectra, nuclear spin	How science works	Kate Appleby	24	4
Understanding NMR spectra	NMR spectra, integral ratios, splitting peaks	Revision note	Kate Appleby	24	4
Indications of change	pH calculations, enthalpy changes, buffers, indicators, equilibrium	Answer back	Mary Hoyle	24	4

Viral chemistry	Antiviral drugs, influenza nomenclature, Relenza, Tamiflu, HIV, Azidothymidine, Ebola	Chemistry in medicine	Emma Dux	24	4
Can we grow gold on plants?	Hyperaccumulation, phytoremediation, phytomining	Back page	Natalie Fey	24	4
Lasers, sunscreens and free radicals	UV radiation, photo-damage, wavenumber and frequency, lasers, sunscreens		Mike Ashfold, Andrew Orr-Ewing, Daniel Murdock, Gareth Roberts, Michael Grubb	25	1
Revising 25 years of chemistry	25 year anniversary of Chemistry Review	Encounter	Anne Hodgson	25	1
Gel chemistry: From jellies to 3D printing	Collagen, gelatin, polymer gels, supramolecular gels, redox gels	25 years of...	Emma Dux	25	1
X-ray eyes on a molecular world	X-ray diffraction, DNA, protein crystals, ribosomes	In pictures	Jean Whittingham	25	1
Extracting caffeine from tea leaves	Tea, caffeine, tannic acids, Büchner filtration, IR spectroscopy	Lab page	Tim Harrison	25	1
Isogram	Anagrams	Making and doing	Anne Hodgson	25	1
Super silver	Silver, extraction, purification		Joanna Buckley	25	1
Reflecting the future	Silver, mirrors, solar cells, window glass		Joanna Buckley	25	1
Copper	Uses, manufacture, purification, electrolysis, alloys, recycling	Focus on industry	Allan Clements, CIEC team	25	1
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Global warming: Reconstructing the past	Global warming, climate change, ocean temperatures, corals, isotopes, radioactive decay, synchrotrons, calcium carbonate		Mark Hodson	25	2
How to make skin cream	Aqueous cream, IR spectroscopy	Lab page	Lynda Dunlop	25	2
Hydrogen cyanide: Poison and precursor	Complex ions, DNA, astrobiology	Substances	Andrew Shaw, Oliver Knight	25	2
X-rays reveal a lost treasure	X-ray fluorescence spectroscopy, <i>Life with Meadow Flowers and Roses</i> , Vincent Van Gogh, art, painting	Wonders of chemistry	Polly Lang	25	2
Amino acids in chemistry	Alpha-amino acids, protein formation	Top tips	Tim Harrison	25	2
Elemental acrostic	Acrostic	Making and doing	Anne Hodgson	25	2

Investigating with isotopes	Isotopes, relative molecular mass, mass spectrometry, isomerism, IR spectroscopy, NMR, food, epimers, testosterone, cocaine, Richard III		Simon Cotton	25	2
Silver: Printing the past	Photography		Joanna Buckley	25	2
Titanium	Uses, manufacture, alloys, electrolysis, oxidation states	Focus on industry	Allan Clements, CIEC team	25	2
Preventing catastrophic climate change	Climate change, greenhouse gases, alternative energy, atmospheric chemistry, carbon capture, carbon sequestration, hydrogen, biofuels	Encounter	Sam Edwards	25	2
Retrosynthesis	Organic synthesis, functional groups, chirality, retrosynthesis	25 years of...	Emma Dux	25	2
Chemistry Week	RSC, ChemNet		Anne Hodgson	25	2
Spectroscopy: At the heart of art	Art forgery, painting, IR spectroscopy, Raman spectroscopy, X-rays, Chagall's <i>Nude</i>	Back page	Polly Lang	25	2
Preserving paintings: Gels, micelles and microemulsions	Micelles, surfactants, emulsions, gels, art restoration, murals, frescos		Michael Nolan	25	3
Esterification	Esters, reflux, recrystallisation, vacuum filtration, melting point determination, yield calculations, IR spectroscopy	Lab page	Tim Harrison	25	3
Who said that?		Making and doing	Anne Hodgson	25	3
Carbene chemistry	Nitrogen-heterocyclic carbene, alkenes, catalysis, molecular orbitals, complexes and ligands, organic synthesis, oxidation state	25 years of...	Emma Dux	25	3
Molecules That Amaze Us	Simon Cotton, Paul May, Paracetamol / acetaminophen, monosodium glutamate	Worth reading	Anne Hodgson	25	3
Medicinal or murderous: Analysing a Victorian medicine cabinet	Tyntesfield House, Victorian medicines, GC-MS	In pictures	Jenny Slaughter, Tony Rogers, Isabel Wiltshire, Dominic Palubiski	25	3

Nitro: Not just for blowing things up	Gunpowder, nitroglycerine, dynamite, TNT, nitromusks, perfume, organic synthesis,		Simon Cotton	25	3
Silver: A versatile element	Silver uses		Joanna Buckley	25	3
All hail the halogens	Oxidation state, balancing equations, redox reaction, half equations, disproportionation	Answer back	Maurice Carmody	25	3
Treating the AIDS epidemic	HIV, AIDS, DNA, antiretrovirals, highly active antiretroviral treatment (HAART)	Encounter	Polly Lang	25	3
Zinc	Alloys, batteries, electrolysis, redox reactions	Focus on industry	Allan Clements, CIEC team	25	3
Colouring in the dinosaurs	Melanosomes, time-of-flight secondary ion mass spectrometry, IR and reflectance spectroscopy	Back page	Polly Lang	25	3
Archaeological chemistry: Analysing ancient alcohol	Alcohol, pulque, mezcal, tequila, fermentation, diagenesis, hopanoids, biomarkers		Marisol Correa Ascencio, Tim Harrison	25	4
A complex way to find nickel compounds	Electron arrangements, complex ions, mole calculations, acid-base reactions	Answer back	Maurice Carmody	25	4
Succeeding in chemistry without A-level maths	Maths, university	Top tips	Marnie Grant	25	4
FT-NMR	Fourier transform nuclear magnetic resonance spectroscopy	25 years of...	Emma Dux	25	4
Iron in the blood	Iron, transition metals, ligands, equilibrium constant, solubility product, stability constant, <i>fac</i> and <i>mer</i> isomers, myoglobin, haemoglobin, carbon monoxide		Simon Cotton	25	4
Magnesium	Magnesium, thermal reduction process, electrolysis	Focus on industry	Allan Clements, CIEC team	25	4
Feeding the world with chemistry	Green chemistry, agriculture, environment, herbicides, insecticides, food fraud	Encounter	Sam Edwards	25	4
Silver: Hallmark of quality	Silver alloy, sterling silver		Joanna Buckley	25	4
Barium	Heavy metal, alkaline earths, environment, electrochemistry	Substances	Magdalena Wajrak	25	4

Isoprene: structural motif of organic chemistry	Colour, smell, terpenes, terpenoids, ozone, rubber, steroids		Simon Cotton	26	1
Synthesising aspirin	Esterification reaction, phenolic compounds	Lab page	Saskia O'Sullivan, Tim Harrison	26	1
The chemistry of LEDs	Light emitting diodes, semiconductors, conductors, insulators, white light	Energy and efficiency	Emma Dux	26	1
Periodic table updated	Superheavy elements	In pictures	Anne Hodgson	26	1
Volatile organic compounds: where do smells go?	VOCs, atmospheric chemistry, ozone, free radical reactions, CFCs, Criegee biradicals		Tim Harrison, Dudley Shallcross	26	1
Molecular crossword	Crossword	Making and doing	Anne Hodgson	26	1
Focus on the basics	Bonding and structure, naming compounds, constructing formulae, balanced equations, equilibrium, benzene reactions, rates of reaction, atom recovery, polymerisation, intermolecular bonding and solubility	Answer back	David Billett	26	1
Dealing with significant figures	Calculations	Top tips	Tim Harrison	26	1
Colourants: Where does colour come from?	Pigments, textile fibres, azo dyes, tautomerism, anthraquinone dyes, phthalocyanines, isomerism, conjugation, energy states, polymers, bonding	Focus on industry	Allan Clements, CIEC team	26	1
Seeing with chemistry	Retinol (vitamin A), terpenoid alcohol, trans-retinal, cis-retinal, isomerisation reaction, opsin, rhodopsin, condensation reaction	Back page	Simon Cotton	26	1
Cold plasma	Spectroscopy, free radicals, states of matter, low-temperature atmospheric pressure plasma, biomedical applications, reactive oxygen and nitrogen species, spectrophotometry		Yury Gorbanev	26	2

Shining a light on solar energy	Electrical conductivity, energy levels, crystal structure, silicon solar cells, dye-sensitised solar cells, perovskite, organic photovoltaic cells	Energy and efficiency	Emma Dux	26	2
Nitration of an arene	Nitration of methyl benzoate, electrophilic substitution, aromatic chemistry, practical techniques, vacuum filtration, thin layer chromatography, recrystallisation, solubility	Lab page	Tim Harrison	26	2
Is every snowflake unique?	Snow crystals, hydrogen bonding	In pictures	Alice Smallwood	26	2
Roses: The chemistry of our favourite flower	Enzymes, stereochemistry, chirality, organic reactions, functional groups, gas chromatography- mass spectrometry (GC-MS), fragrance molecules, odour units		Simon Cotton	26	2
Chemword	Crossword	Making and doing	Anne Hodgson	26	2
Wrack your brains	Iodine, seaweed, oxidation state, half equations, oxidation and reduction, halogens, electron configuration, titrations, mole calculations	Answer back	Maurice Carmody	26	2
Classifying colourants by method of application	Applications of chemistry, bonding, fibres and polymers, aromatic structures, acid dyes, metal-complex dyes, basic dyes, disperse dyes, reactive dyes, vat dyes, sulphur dyes	Focus on industry	Allan Clements, CIEC team	26	2
Back to Sherlock's crime scene	Catalase, hydrogen peroxide, forensic chemistry, luminol test, chemiluminescence	Back page	Dominika Pasternak	26	2
Reconstructing past climates using molecular fossils	Climate change, extraction techniques, fossil fuels, microorganisms, analytical techniques, Eocene epoch, biomarkers, sedimentary record, GDGT		Gordon Inglis, Richard Pancost, Tim Harrison	26	3

Nucleophilic substitution	Nucleophiles, substitution reactions, curly arrow mechanisms, halogenoalkanes, dot-and-cross diagrams, Sn2 mechanism, electronegativity	Revision note	William Stockburn	26	3
Not-so stainless steel	Green rust, oxidation and reduction, mole calculations, half equations, oxidation states, complex ions, ligands	Answer back	Maurice Carmody	26	3
Pigments and high-tech colourants: What are the technical applications of colour?	Dyes, pigments, hydrogen bonding, molecular structure, polymers, solubility, liquid crystal displays, laser dyes, ink jet printing, photodynamic therapy, cancer treatment	Focus on industry	Allan Clements, CIEC team	26	3
Mass, moles and gas equations	Calculations	In pictures	Anne Hodgson	26	3
Batteries required: Advances in energy storage	Electrochemistry, oxidation and reduction, electrolytic cell, rechargeable batteries, lithium ion batteries, flow batteries, flow lithium batteries	Energy and efficiency	Emma Dux	26	3
Make your own dye	Diazo dyestuff, orange azo dye, diazonium compounds, practical techniques, vacuum filtration, solubility, methyl orange indicator	Lab page	Tim Harrison, Nick Barker	26	3
Flavour chemistry: Changing the taste of tomatoes	Isomerism, stereoisomers, E/Z (cis/trans) isomerism, epimers, enzymes, conjugation, spectroscopy, energy levels, colour chemistry, double bond equivalents, odour units		Simon Cotton	26	3
Life in undergraduate labs	Practicals, university, safety	Encounter	Jessica Entwistle	26	3
Life-saving viper	Snake venom, fer-de-lance viper, hypertension, captopril	Back page	Anne Hodgson	26	3
Chiral chemistry: where does enantiomerically pure material come from?	Chirality, racemic/non-racemic mixtures, plane-polarised light, enantiomers, amino acids		Russell Banta, Shane Daly	26	4

Electrophilic substitution of aromatic rings	Aromatic compounds, benzene rings, nitration of benzene, halogenation of benzene, acylation of benzene	Revision note	William Stockburn	26	4
The many aromas of dimethyl sulfide	Molecular shapes, oxidation state, oxidation numbers, boiling points, intermolecular forces, hydrogen bonding		Simon Cotton	26	4
Know your glassware	Practical chemistry	In pictures	Anne Hodgson	26	4
Concentrate for first-rate answers	Kinetics, reaction rate, reaction mechanism, rate equation, rate constant	Answer back	Maurice Carmody	26	4
Fuel from sunshine	Enthalpy, entropy, Gibbs free energy, semiconductors, oxidation and reduction, redox reactions, artificial photosynthesis, thermodynamics	Energy and efficiency	Emma Dux	26	4
Atmospheric camp at York	Atmospheric monitoring, ozone, air quality and health, atmospheric layers, temperature inversion, urban pollution levels	Encounter	Josie Lewis, Lorien Birch, Freya Brown	26	4
Making paint	Solvents, applications of chemistry, organic reactions, esterification, pigments, acrylic polymers, alkyd polymers, epoxy polymers	Focus on industry	Allan Clements, CIEC team	26	4
The two sides of thalidomide	Chirality, enantiomers	Back page	Jessica Entwistle	26	4
Galactic chemistry	Amino acids, proteins, enzymes, isomers, chirality, alkynes, mass spectrometry, astrochemistry		Simon Cotton	27	1
Optical isomers and penicillin	Chirality, amino acids, antibiotics	Did you know?	Simon Cotton	27	1
Jet fumes in the cabin: The aviation industry's dirty secret?	Organophosphates, isomers, enzymes, aircraft engine, fume event, aerotoxic syndrome, jet fuel, tricresyl phosphate (TCP)		Stefan Swift	27	1
Massive open online courses (Moocs)	FutureLearn, Exploring Everyday Chemistry Mooc	Chemistry online	Andy Parsons	27	1



The chemistry behind baking	Reactions of carbonates, hydrogen bonding, sugars, proteins, fats, flour, butter, egg, baking powder	In pictures	Jessica Entwistle	27	1
Landmine-detecting bacteria	Analytical chemistry, nitro compounds, proteins, DNA, RNA, bioreporting, bioluminescence, TNT	Wonder bugs	Emma Dux	27	1
Acids, alkalis and pH	Weak acids, neutralisation reactions, pH calculations, ionic product of water, equilibrium calculations, concentration calculations, significant figures and logs, buffer solutions and approximations in related calculations, inorganic formulae	Answer back	Maurice Carmody	27	1
Analgesics	Medicinal chemistry, chirality, R/S enantiomers, paracetamol, NSAIDs, aspirin, ibuprofen, opioids, compound analgesics, conotoxins, morphine, codeine	Substances	Alice Smallwood	27	1
The Sun and moons	How Many Moons Does the Earth Have?, What Colour is the Sun?, Brian Clegg	Worth reading	Anne Hodgson	27	1
Fuelling Formula 1	Fuel combustion, motor sport	Back page	Sam Daly	27	1
The coke in Coca-Cola	Medicinal chemistry, chemical extraction methods, neurotransmitters, coca leaves, kola nut, extracting cocaine, norepinephrine (noradrenaline), epinephrine (adrenaline)		Jessica Pound	27	2
Science Down Under	2017 International Science School, materials chemistry, time of flight mass spectrometry, industrial chemistry, sodium hydroxide production, electrolysis, redox reaction, determining water hardness, titrations, chelating ligands/complexes, 3D atom probe microscopy	Encounter	Anne Hodgson	27	2

Holy smoke	Frankincense, reactions of alcohols, reactions of carbonyl compounds, uses of IR spectroscopy, carbon-13 NMR spectroscopy, mass spectrometry, chirality, isomers, redox reactions, hybrid orbitals		Simon Cotton	27	2
Volumetric analysis	Laboratory skills, mole calculations	Lab page	Sam Daly	27	2
Plastic-eating bacteria	Polymer applications, polymer synthesis, polymer recycling, enzymes, PET, PETase, MHET, MHET hydrolase	Wonder bugs	Emma Dux	27	2
Rachel Louise Carson: Environmental champion	Organochlorides, environmental chemistry, pesticides, DDT, Silent Spring	Scientists of substance	Dimitrina Trendafilova	27	2
Chemical vocabulary	Crossword	Making and doing	Anne Hodgson	27	2
Squeaky clean with surfactants	Applications of chemistry, saponification, catalysis, anionic surfactants, alkylbenzene sulfonates, alkyl sulfates, alkyl ether sulfates, soaps	Focus on industry	Allan Clements, CIEC team	27	2
Botulinum toxin: Killer or cure?	Botox, botulism	Back page	Alex Bytheway	27	2
Apocalypse chemistry	Filtration, flocculation, pH, chelating agents, ligands, surface area, disproportionation, water treatment, activated charcoal, chlorination		Omar Shah	27	3
Acetals and hemiacetals	Carbonyls, nucleophilic addition reactions, curly arrow mechanisms, optical isomerism, chirality, equilibrium calculations	Answer back	Maurice Carmody	27	3
Interview with Nobel prizewinner Bernard Feringa	Molecular machines, 2016 Nobel prize in chemistry	Encounter	Sam Daly	27	3
Does warm water freeze faster than cold water?	Experimental design, physical chemistry, changes of state	Making and doing	Anne Hodgson	27	3
Know your units	Base units, derived units, multiplication factors	Revision note	Alexander Bytheway	27	3
Raku pottery: Redox in action	Oxidation, reduction, glazes	In pictures	Anne Hodgson	27	3

Soap and other surfactants	Applications of chemistry, saponification, hydrogen bonding, soap manufacture, cationic surfactants, mono alkyl quaternary systems, esterquats, nonionic surfactants, amphoteric surfactants	Focus on industry	Allan Clements, CIEC team	27	3
Microbial medicine factories	Medicinal chemistry, aspirin, malaria, antimalarial drugs, quinine, mefloquine, artemisinin, bioengineering, yeast, hydrocodone	Wonder bugs	Emma Dux	27	3
Fruity esters	Chirality, esterification, functional groups, isomerism, NMR spectroscopy, amino acids, lactones, propyl ethanoate, propan-2-yl ethanoate, proton NMR signals, Coenzyme A (CoA)		Simon Cotton	27	3
Esterification mechanisms	Esters, reaction mechanisms, curly arrows	Top tips	Simon Cotton	27	3
Molecular cars	Molecular motors, rotary motor	Back page	Sam Daly	27	3
Candy-coated chemistry	Acid-base reactions, crystallisation, enzymes, carbohydrate chemistry, sugars, sweets, fudge, sherbet, popping candy, chocolate mints		Sam Daly	27	4
Chemical conundrum	Puzzle	Making and doing	Anne Hodgson	27	4
Solving climate change in a week	Green chemistry, oils, lubricants, biodiesel, IR spectroscopy, gas chromatography, oxidation, carbonyl chemistry, work experience	Encounter	Jess Smith, Tom Owens, Jonny Ruffell	27	4
Turmeric: Medicinal applications	Metal complexes, oxidation, acids and bases, radicals, medicinal chemistry, curcumin, turmerone, Alzheimer's disease, antioxidants	Substances	Yrina Ghrabigi	27	4

Chemicals in cleaning	Applications of chemistry, surfactants, bleaching/oxidising agents, environmental chemistry, laundry detergents, dishwasher tablets, washing-up liquid, shampoo, shower gel, hair conditioner, fabric softener	Focus on industry	Allan Clements, CIEC team	27	4
Saving SS <i>Great Britain</i> : Redox in action	Iron, corrosion, rust, conservation	In pictures	Anne Hodgson	27	4
Cancer, catalysts and square planar coordination	Transition metals, d-block elements, catalysis, coordination chemistry, oxidation states, redox reactions, addition reactions, <i>cis</i> - and <i>trans</i> -isomers, cisplatin, Vaska's compound, Wilkinson's catalyst		Simon Cotton	27	4
Testing turmeric	Colour chemistry, tautomers/isomers, pH, fluorescence, dye	Lab page	Yrina Ghrabigi	27	4
New fuels from nature	Chirality, enzymes, sugars, polysaccharides, green chemistry, polymers, biofuels, cellulose, wood	Wonder bugs	Emma Dux	27	4
Sunshine and vitamin D	UV light, vitamin D	Back page	Emma Dux	27	4
Breath of life	VOCs, volatile organic compounds, GC-MS, biomarkers, breathalysers, breathomics		Andrew Parsons	28	1
Bees, honey and venom	Bees, honey, venom, apitoxin, honeycomb, propolis, beeswax, royal jelly, royalactin	Animal chemistry	Emma Dux	28	1
Drugs and dyes	Medicinal chemistry, aniline, phenylamine, acetanilide, phenacetin, paracetamol, acylation reactions, diazotisation, azo dyes, curry arrow mechanisms		Simon Cotton	28	1
Elements of smartphones	Lithium-ion battery, touchscreen, LCD, liquid crystal display, camera, system-on-a-chip	In pictures	Maria Turkenburg	28	1

Polymers and azo dyes	Polymer, azo dyes, amines, amides, carboxylic acids, acyl chlorides, aryl amines, diazonium salts, nitration, mechanism of electrophilic substitution of benzene rings, percentage yield calculations	Answer back	Maurice Carmody	28	1
The continuum of bonding	Covalent bonding, ionic bonding, electronic configuration, Hess's law	Revision note	Lynden Astill	28	1
The Disappearing Spoon	Periodic table, properties of elements, Sam Kean	Worth reading	Sofia Helin	28	1
Extracting oil and gas	Industrial chemistry, hydrocarbons, alkanes, oil, gas, drilling	Focus on industry	Allan Clements, CIEC team	28	1
Solar power: Nature does it better	Renewable energy, biophotovoltaics, photosynthesis, chlorophyll	Wonders of chemistry	Mary Wood	28	1
Conservation and cyclododecane	Conservation, CDD, cyclododecane	Back page	Lukas Geciauskas	28	1
How clean is our air?	Atmospheric chemistry, pollution, photochemical smog, tropospheric chemistry, particulate matter, nitrogen oxides, NO <sub>x</sub> , VOCs, volatile organic compounds, ozone, chain radical reactions, universal gas law		Silvia Pugliese, Matthew Johnson	28	2
Disentangling polarity	Ionic polarity, bond polarity, molecular polarity, dipoles, electronegativity, bonding, <i>E/Z</i> isomerism	Revision note	Lynden Astill	28	2
Frogs and toads	Frogs, toads, medicinal chemistry, poisons, batrachotoxin, epibatidine, bufotenin, hibernation	Animal chemistry	Emma Dux	28	2
Flying over fires	Atmospheric chemistry, moorland fires, pollution	In pictures	Dominika Pasternak	28	2
What's your poison?	Arsenic, wallpaper, copper arsenite, Scheele's Green, March's test, molecular shapes		Simon Cotton	28	2

Photochemistry and drug synthesis	Medicinal chemistry, drug synthesis, retrosynthesis, anhydride formation, ring formation, photochemistry, photocycloaddition	Chemistry in medicine	Bethan Donnelly, Tim Harrison	28	2
What happens in an oil refinery?	Industrial chemistry, fractional distillation, hydrocarbons, oil, gas, fractionating towers	Focus on industry	Allan Clements, CIEC team	28	2
Investigating the structure of nucleic acids	Nucleic acids, radicals, analytical techniques, DNA, RNA, hydroxyl radical probing, DMS, CMCT, kethoxal, SHAPE, LASER	How science works	Ross Ward	28	2
Spectroscopy of space	Excitation of atoms, absorption spectra, stars	Back page	Nicholas Lau	28	2
Are vehicle exhaust fumes damaging our health?	Atmospheric chemistry, air quality, vehicle pollution, greenhouse gases, nitrogen oxides, NO <sub>x</sub> , exothermic combustion reactions, hydrocarbons, petrol, diesel, fuel efficiency automobile testing (FEAT), IR spectroscopy, UV-vis spectroscopy		Naomi Farren	28	3
Synthesis and analysis	Practical techniques, displayed formulae, skeletal formulae, molecular formulae, oxidation of alcohols, acid/base reactions, balanced equations, mole calculations, theoretical yields, percentage yields, IR spectroscopy, interpreting mass spectra	Answer back	Maurice Carmody	28	3
Cats and dogs	VOCs, volatile organic compounds, smell, catnip, nepetalactone, cat litter, bentonite, feline, milk plastic, galalith,	Animal chemistry	Emma Dux	28	3
Periodic table completed?	Periodic table, superheavy elements	In pictures	Anne Hodgson	28	3

Elements old and new	Periodic table, atomic number, heavy elements, superheavy elements, relative atomic mass, radioactive decay, isotopes, moscovium, nihonium, oganesson, tennessine, IUPAC	Wonders of chemistry	Sofia Helin	28	3
Periodic Tales: the Curious Lives of the Elements	Periodic table, noble gases, metals, alloys, Hugh Aldersey-Williams	Worth Reading	Anne Hodgson	28	3
Valuable vanilla	Vanilla, vanillin, enzymes, isomerism, isotopes, NMR spectroscopy, food fraud		Simon Cotton	28	3
Cracking and related refinery processes	Industrial chemistry, hydrocarbons, steam cracking, catalytic cracking, isomerisation, reforming, alkylation, dealkylation, disproportionation	Focus on industry	Allan Clements, CIEC team	28	3
Knock, knock...	Industrial chemistry, petrol, gasoline, hydrocarbons, car engines, octane rating	Did you know?	Allan Clements, CIEC team	28	3
Valentine chemistry	Flavones, flavonols, antioxidants, pigments, flower petals, quercetin, fisetin	Back page	Sofia Helin	28	3
Organic nitrogen: the secret killer in Chinese megacities	Atmospheric chemistry, particulate matter, air pollution, photochemical smog, organic nitrogen species, nitroaromatic compounds, animal testing, toxicology, DNA,		Stefan Swift	28	4
Fracking	Hydraulic fracking, shale rock, fracturing, methane, ethene, propane	Focus on industry	Allan Clements, CIEC team	28	4
Chemistry with altitude	Atmospheric chemistry, analytical chemistry, GC-MS,	Encounter	Dominika Pasternak	28	4
Reactions: the Private Life of Atoms	Peter Atkins	Worth Reading	Anne Hodgson	28	4
What shape is my molecule?	Molecular shapes	In pictures	Emma Dux	28	4
Phosphorus: the essential element	Phosphorus, phosphane, ammonia, molecular shapes, trihalides, acids, basicity, pentahalides, nucleic acids, DNA, RNA, ATP		Simon Cotton	28	4

The future of the periodic table	Periodic table, atomic number, electron configuration, Charles Janet, left-step periodic table, Otto Theodor Benfey, spiral periodic table, Tim Stowe, physicist;s periodic table	How science works	Chris Coates	28	4
Spiders	Spiders, spider venom, amino acids, cysteine knot, spider silks, spidroins,	Animal chemistry	Emma Dux	28	4
Constructing an electrochemical cell	Electrochemical cells, laboratory skills, electrochemistry,	Lab page	Sam Daly	28	4
The chemistry of coral bleaching	Coral, phytoplankton, zooxanthellae, coral bleaching	Back page	Lily Pople	28	4
Is vaping really safer than smoking?	Vaping, smoking, e-cigarettes, nicotine, tobacco, carcinogens		Simon Cotton	29	1
Energy	Forms of energy, energy levels, quantised energy, microwave radiation, spin states	How science works	Alex Bytheway	29	1
Atomic structure: part 1	Atomic structure, atomic theory, model of the atom	A brief history of...	Emma Dux	29	1
Scrambled scientists	Puzzle	Making and doing	Anne Hodgson	29	1
Cave chemistry	Caves, limestone, calcium carbonate, speleothems	In pictures	Stephanie Batten	29	1
Cantharidin: From aphrodisiac to cancer cure	Cantharidin, Spanish fly, blister beetles, toxicity, antidotes, Diels-Alder reaction		Andrew Parsons	29	1
Concentrate on sulfuric acid	Reaction mechanisms, reactions of alkenes, geometric and structural isomerism, oxidation of alcohols, reactions of halides with concentrated sulfuric acid	Answer back	Maurice Carmody	29	1
Chemistry in knots	Macramé, periodic table	Making and doing	Anne Hodgson and Jane Stewart	29	1



Scrambled scientists	Hennig Brand, Humphry Davy, Marie Curie, Glenn Seaborg, Dmitri Mendeleev, Ernest Rutherford, Albert Einstein, Niels Bohr, Isaac Newton, Anders Celsius, Charles-Augustin de Coulomb, John Dalton, Robert Bunsen, Emil Erlenmeyer, Johan Kjeldahl, Julius Petri	Did you know?	Anne Hodgson	29	1
Aluminium	Aluminium production, bauxite, aluminium oxide, cryolite, aluminium fluoride, electrolysis	Focus on industry	Allan Clements, CIEC team	29	1
Radical clean-up	Pollution, hydroxyl radical, climate change	Back page	Stephanie Batten	29	1
Partitioning proteins	Amino acids, proteins, DNA, X-ray crystallography, diffraction, Bergmann-Niemann hypothesis, wool fibres, partitioning chromatography		Kersten Hall	29	2
Chameleon colour changes	Chameleons, structural colours, superficial iridiphores, lattice/crystalline structures, osmosis	Wonders of chemistry	Stephanie Batten	29	2
Where would we be without chlorine?	Chlorine, silicon(IV) chloride, titanium(IV) chloride, sodium chloride, oxidation state, bleach, potassium chlorate, matches, fireworks, metal chlorides		Simon Cotton	29	2
The elephant in the lab	School science club, decomposition of hydrogen peroxide, elephant's toothpaste experiment, catalysis, molecular orbital diagram	Encounter	Nicholas Lau	29	2
The elephant's toothpaste experiment	Decomposition of hydrogen peroxide, elephant's toothpaste experiment	In pictures	Nicholas Lau	29	2
Analysing limescale remover by acid-base titration	Acid-base titration, limescale remover, hardness of water, calcium carbonate	Lab page	John McCullagh	29	2

Atomic structure: part 2	Atomic structure, quantum physics, electromagnetic radiation, blackbody radiation, the photoelectric effect, photons, Planck's constant, atomic emission line spectra, electron orbital filling, shapes of orbitals, quantum mechanical model, quantum theory, Heisenberg's uncertainty principle, the Schrödinger equation, neutrons	A brief history of...	Emma Dux	29	2
Iron	Metal extraction, redox reactions, cast iron, wrought iron, steel, iron ore, coke, blast furnace	Focus on industry	Allan Clements, CIEC team	29	2
Cosmetic scientist	Cosmetic industry, process chemist	Careers in chemistry	Rachael Davison	29	2
Endangered elements	Periodic table	Back page	Anne Hodgson	29	2
The chemical weaponry of plants	Pollination, natural pigments, conjugated systems, carotenoids, flavonoids, isoprene, visible light, pH, bees, terpenes, terpenoids, primary and secondary metabolites		Bridget O'Boyle	29	3
The f block elements	Periodic table, f block elements, electron configuration, lanthanides, actinides, Aufbau principle, atomic orbitals, radioactivity, oxidation states, magnetic resonance imaging (MRI), reducing agents, contrast agents, gadolinium	How science works	Sam Daly	29	3
Mystery metal	Puzzle	Making and doing	Anne Hodgson	29	3
Naming ( <i>R/S</i> ) isomers	Chirality, ( <i>R/S</i> ) isomers	Top tips	Anne Hodgson	29	3
Fighting fallacies in chemistry communications	Fallacies, argumentum as hominem, appeal to authority	How science works	Lynda Dunlop, Joshua Stubbs	29	3
Do you know your functional groups?	Alkenes, alcohols, halogenoalkanes, halogenoalkenes, amines, amides, carboxylic acids, ethers, esters, aldehydes, ketones	In pictures	Alex Bytheway, Connor Rutter	29	3

Why do we smell?	Chiral molecules, ( <i>E/Z</i> ) and <i>cis/trans</i> isomerism, aliphatic and aromatic hydrocarbons, sweat, death, dogs, forensics, esters, thiols		Simon Cotton	29	3
Recharging the batteries	Electrochemistry, lead-acid batteries, lithium batteries, Nobel prize, bioengineering, potato batteries,	Wonders of chemistry	Sofia Helin	29	3
Steel	Steel production, basic oxygen steelmaking process, electric arc furnace process, secondary steelmaking, casting, recycling	Focus on industry	Allan Clements, CIEC team	29	3
Red cabbage indicators	Red cabbage, pH, anthocyanins	Making and doing	Anne Hodgson	29	3
Highlighting hair dye	Dyes, pigments, hair, cuticle, cortex, medulla, bleaching,		Ross Ward	29	4
The chemistry of nuclear energy	Nuclear energy, atomic structure, nuclear fission, radioactivity, enrichment, uranium		Emma Dux	29	4
Maxwell-Boltzmann distribution curves	Maxwell-Boltzmann distribution curves, reaction rates	Revision note	Anne Hodgson	29	4
Myth busting	Logical fallacies, false dilemma, false dichotomy, post hoc ergo propter hoc, spurious correlations	How science works	Lynda Dunlop, Joshua Stubbs	29	4
Acids and their uses	Mineral acids, hydrochloric acid, hydrofluoric acid, nitric acid, phosphoric acid, sulfuric acid, organic acids, citric acid, lactic acid, carbonic acid, ethanoic acid	In pictures	Alex Bytheway, Connor Rutter	29	4
Lead's poisonous legacy	Lead, paint, pipes, petrol, gasoline, tetraethyllead, catalytic converters, complexing agent, complexes, ligands, stability constant <i>K</i>		Simon Cotton	29	4
Sugar: A bittersweet tale?	Sugar, carbohydrates, monosaccharides, disaccharides, human nutrition, diabetes, sucrose, corn syrup	Substances	Jeffrey Deakin	29	4
Chemical crossword	Crossword	Making and doing	Peter Wade-Wright	29	4

Lead	Lead production, redox reactions, smelting, recycling, alloys	Focus on industry	Allan Clements, CIEC team	29	4
Chemistry in China	Sichuan University, supramolecular chemistry, DNA analysis, G-quadruplexes	Encounter	Lawrence Henry	29	4
Creating the lunar seas	Moon, maria, terrae, KREEP, thorium	Back page	Stephanie Batten	29	4