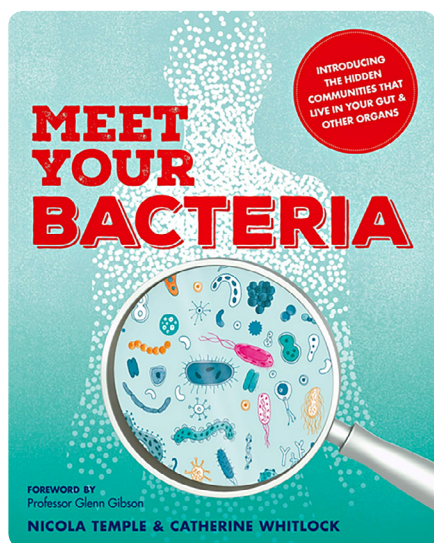


Reviews

Reviews published in *School Science Review* are the opinions of individual reviewers, and are not an official Association for Science Education (ASE) view or endorsement of the resource. Reviewers are selected to write reviews on the basis of their experience and interests. They are expected to draw attention to perceived weaknesses or limitations of a resource as well as its strengths. The reviews are written from the standpoint of someone seeing the materials for the first time and considering how they themselves would use them, or think colleagues would be likely to use them.

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Meet Your Bacteria
Nicola Temple and Catherine Whitlock
London: Cassell, 2018
192 pp. £14.99
ISBN 978 1 84403 973 9

Over recent years the bacteria that make up our microbiome have been linked to a plethora of diseases and conditions, from diabetes and obesity to autism and anxiety. As a result, the human microbiome is an area

of increasing interest to the public, with books such as Giulia Enders' *Gut: The Inside Story of Our Body's Most Underrated Organ* becoming a *Sunday Times* bestseller. Having enjoyed *Gut*, I was excited to receive my copy of *Meet Your Bacteria*, hoping to find out more about the complex interactions between us and the trillions of bacteria that live in and on us. *Meet Your Bacteria* did not disappoint: more wide-ranging than *Gut*, it introduces us to the trillions of bacteria found in every part of our bodies and at every stage of our lives, highlighting their importance to our health and well-being.

Meet Your Bacteria begins with some general information such as what bacteria are, what they look like, how they infect us and how our immune system responds to them. Subsequent chapters examine the communities of bacteria found in our skin, eyes, mouth, gut and urogenital system

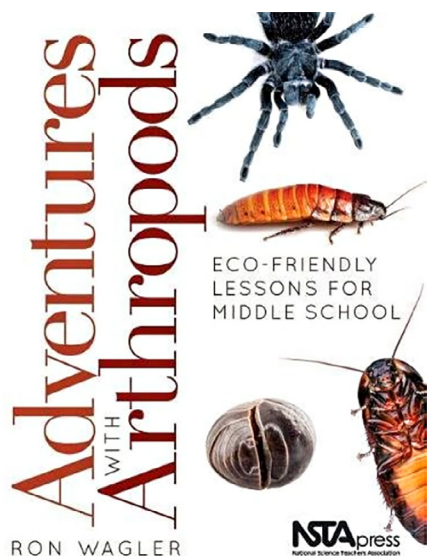
in more detail, describing both the good and the bad bacteria and how they interact. There are in-depth profiles of important bacteria, such as those that cause food poisoning and diseases such as cholera and those that benefit us, for example by helping digest our food or preventing pathogens from infecting us. Advice is given on how to encourage the good and discourage the bad for each area of the body. I was intrigued to find out that eating raw onions can destroy bacteria that cause gum disease and tooth decay and that dietary salt could reduce good gut bacteria!

The book concludes with a chapter on how your actions influence your biome and how it, in turn, affects you. This brings together new and different thinking about bacteria, such as the interaction between bacteria and mood and how nanoparticles can be used to fight pathogens.

Meet Your Bacteria falls somewhere between a textbook and a general reading book, containing a good depth of information along with lots of illustrations and surprising facts. While the authors are not microbiologists, they are clearly excellent communicators and have written an informative and amusing guide to this complex topic.

I would recommend this book for the general reader who wishes to know more about the human biome and how to keep healthy. While aimed at adults, the layout and illustrations will make the book appealing to teenagers and it would make useful background reading for those studying GCSE and A-level biology to stimulate an interest in this important area.

Sarah Wood



Adventures with Arthropods: Eco-friendly Lessons for Middle Schools

Ron Wagler

Arlington, VA: NSTA Press, 2018

110 pp. £22.50

ISBN 978 1 68140 305 2

Adventures with Arthropods is a slim volume and is essentially a teachers' guide to keeping and using arthropods in schools to teach a variety of topics ranging from anatomy to behaviour. The title is perhaps rather misleading,

as a limited number of arthropods are detailed: Madagascar hissing cockroaches, terrestrial isopods (woodlice) and tarantulas – so not really a wide-ranging collection of organisms.

After a brief introduction on the global biodiversity of arthropods and a note on safety considerations, subsequent chapters (two or three per organism) detail how to care for them and give some ideas for using them in lessons. The book is intended for the American education market and so the details of US education 'Next Generation Standards' supported by given practicals are irrelevant, although generic enough to be applicable in any educational context. There are plenty of good ideas among the suggested practical work (26 lessons in total are detailed), largely applicable only up to IGCSE level although several could be adapted for A-level biology teaching. The practicals only cover anatomy, growth and behaviour, so the scope of the book is by definition somewhat limited.

Adventures with Arthropods would be a useful addition to a prep room library, particularly in a department new to keeping arthropods (although it should be stressed again that only three organisms are covered). I could also see the book being useful for a science club or similar as it is a useful source of project ideas up to year 11 (age 15–16).

Peter Anderson

The Big Ideas in Physics and How to Teach Them: Teaching Physics 11–18

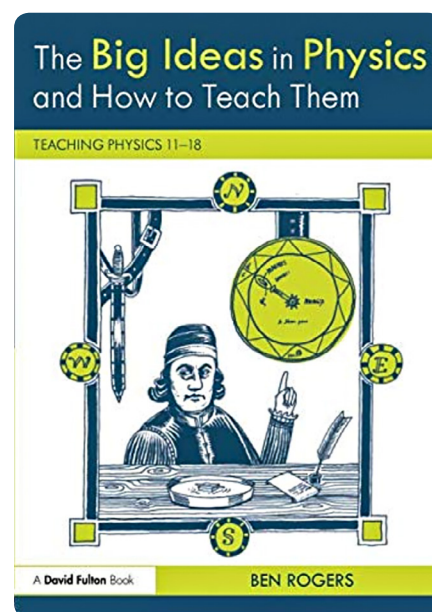
Ben Rogers

Abingdon: Routledge, 2018

136 pp. £19.99

ISBN 978 1 138 23506 9

This book is aimed at anyone new to teaching physics, but



particularly non-specialists. The 'Big Ideas' in the title are electricity, forces at a distance, energy, particles and the universe. Each of these gets its own chapter, but the book starts with a chapter on cognitive load theory and ways of reducing cognitive load in order to promote more effective learning. The first chapter also emphasises the importance of dealing with misconceptions and offers suggestions such as getting students to complete 'refutation text' sentence starters along the lines of 'Many people believe ...', 'However, ...' and 'Most scientists state that ...'.

The ideas and approaches introduced in this first chapter underpin everything that follows in the other five chapters. They include familiar strategies such as using worked examples, completion exercises, sequencing, outline plans, and similarities and differences lists to compare, say, two models or two states of matter. In the Big Ideas chapters, the strategies introduced in the first chapter are presented in context, along with a model lesson plan showing how several of the strategies could be integrated into a 60-minute lesson.

Apart from the cognitive load theory approach, the other key

feature of the book is that each Big Idea chapter begins with a sizeable historical section outlining the key discoveries and their significance: the author's stated aim in doing so is 'to use the privileged power of stories to rapidly build and develop schemata'. Along with the accounts of key events, there are black-and-white images of the relevant historical scientific apparatus and suggestions for some practical demonstrations.

In the Introduction, the author tells us that he constructed the book around a map of the big ideas of physics (Figure i.1 'A series of timelines showing when key events in the history of physics took place'). I wondered why the five physics themes that the timelines stemmed from on the left of the map were electrostatics, magnetism, gravity, space and particles, rather than the five Big Ideas of the main chapters. The energy timeline starts in the 17th century, but there are only five timeline arrowheads emerging in the 20th century. The map itself is quite small (less than half a page) and it took a while for me to spot 'electricity' in the mid 19th century, among all the names of scientists. I would have liked more commentary at this stage about the rationale for what was shown in the map and the way the map was constructed.

Although I have always enjoyed the history of science, this book's historical approach didn't really work for me. Once I progressed onto the main chapters, I found myself experiencing 'Are we there yet?' moments as I encountered seemingly page after page of history. In the chapter on electricity, for example, over half the chapter is taken up by the 'history' section as opposed to the 'classroom' section.

To be fair, the history/classroom split is more balanced in the other chapters, but electricity

came first and it didn't create a good first impression. The black-and-white photographs illustrating the suggested demonstrations didn't help, either. In the absence of any labels, it was not always easy to distinguish the relevant parts of the experimental set-up from the background: when I first saw the photograph for Gilbert's versorium needle (Figure 1.2), it took a little while to make sense of what I was looking at and to realise that the concentric circles were the design on a kitchen tray that the apparatus had been placed on. The tray features in other photographs in the chapter, including Figure 1.7, 'A kitchen demonstration of the Leyden jar', where the pattern is particularly distracting. The use of poor-quality images such as these is very disappointing, especially when the author has previously emphasised the need to help learners by directing attention to relevant details.

There is a lot of good advice in this book, not just on how to do something and what to look out for but also on why it is important. The recommendations for further reading at the end of each chapter are also good, although there is a lot of repetition from one chapter to another. It is just a pity that the presentation at times detracts from the message.

Miriam Chaplin

Sharks: Ancient Predators in a Modern Sea

Salvador Jorgensen
New York: Firefly Books, 2018
256 pp. £18.95
ISBN 978 0 2281 0080 5

Since the time of Aristotle, naturalists have been fascinated by sharks. Essentially unchanged for more than 400 million years, they are the supreme predators. But for all their awesome majesty, sharks are in danger like never before.

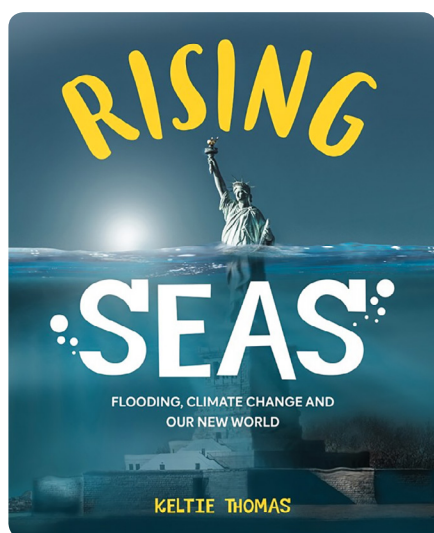


They have only one serious enemy – man, and their numbers are now being so reduced by accidental and deliberate fishing that some species actually risk extinction. This book has been written in the hope that the more we understand about these magnificent animals, the more we will try to protect them. A most worthwhile aim.

There are more than 500 species of sharks in the world's oceans and this account begins with a review of their classification and phylogeny. Each major group is then described in detail, with as much natural history information as is generally known, and illustrated with some superb photographs. Depth distribution and review by habitat is followed by detailed discussions of life-history strategies, reproduction, general biology and behaviour.

There is not a lot known about sharks that is not at least summarised in this excellent book. It is very clearly written, beautifully illustrated and passionate in its cause: to make people aware of just how amazing this group of fish are and just how precarious is their survival. Most populations are so slow-growing that fishing pressures exerted by humans are simply unsustainable. As top predators in many ocean systems, their loss will have an incalculable effect on entire ecosystems. We have been warned.

Ian Lancaster



Rising Seas: Flooding, Climate Change and Our New World

Keltie Thomas

Ontario: Firefly Books, 2018

64 pp. £7.95

ISBN 978 0 2281 0021 8

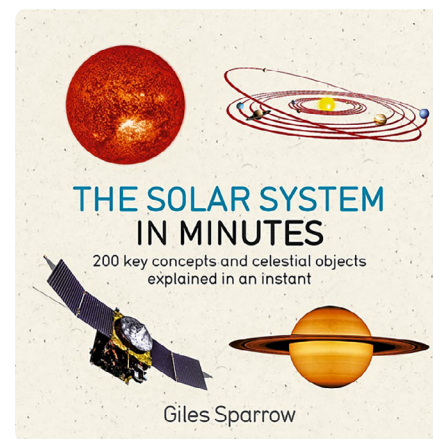
This book is aimed at children from year 4 to year 8 (ages 8–13). It alerts youngsters to the environmental harm we are wreaking on our planet. However, though it promised much, I cannot recommend *Rising Seas* to support science teaching, partly because the little science it contains is plain wrong. For example, it explains that the Earth is ‘getting hotter and hotter’ (correct) because ‘as our carbon emissions build up, the atmosphere gets thicker’ (wrong) which ‘traps heat from the Sun’ (also wrong).

After an introduction, which is way too brief, we get a series of case studies, each typically spanning four pages, written in an overly chatty style. While the factoids selected are mostly interesting, it is worthy of Top Trumps. These case studies include coastal cities, mainly American, some island nations such as the Maldives, low-lying countries such as the Netherlands and Bangladesh, as well as Greenland and Antarctica. There are also errors that should have been picked up at the editing stage. For example, sea levels have risen 8 inches since 1880 but, while on page 4 this is correctly given as

equivalent to 20.32 cm, by page 7 it is only worth 15 cm. The book is lavishly illustrated, often with images to portray how cityscapes might look when they are flooded. However, diagrams to help explain the text would have been more helpful. Without a sketch, readers (even adults) will not understand why New York City is sinking or how the ice sheet on Antarctica might collapse.

This book needs a much longer introduction, to properly and correctly introduce the science, starting with the greenhouse effect. Thermal expansion of the oceans is mentioned but the author could have added that floating ice (e.g. icebergs, Arctic ice) does not contribute to sea-level rise when it melts (courtesy of Archimedes’ Principle). She mentions the sea-level rise that would result from the melting of the Greenland and Antarctic ice sheets but this should have been brought together in an introduction and compared with historical sea levels and scientific projections of sea-level rise, perhaps with maps to show how far the water would encroach in response to the different scenarios. She should have explained how sea level is measured: by using satellites and tide gauges, sheltered from waves by stilling wells. Among the case studies she does say that the land moves too so that sea levels cannot be an absolute measurement (due to plate tectonics, isostatic rebound, etc.). She could have added that even the weight of a coastal city can lead to subsidence and relative sea-level rise; the loss of groundwater beneath Alelaide has caused it to sink relative to the sea. There is no mention of the IPCC or the recent Paris Agreement. It is clear that the author writes well but this book misses its target.

Mike Follows



The Solar System in Minutes

Giles Sparrow

London: Quercus Editions, 2018

415 pp. £10.99

ISBN 978 1 78648 585 4

This is a very compact book measuring about 13 centimetres square and with a thickness of 3 cm. A consistent format is used throughout, with the left-hand page giving textual information and the facing right-hand page showing one of the numerous black-and-white photographs or the occasional diagram or table of data. The use of black-and-white photographs obviously brings the production costs down, and is not a great hindrance as interested readers could use these as a spur to look at the original published images. The book is clearly written, with a minimum average reading age of about upper secondary.

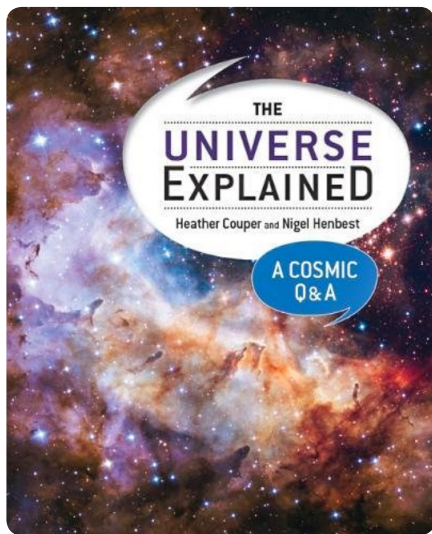
The author takes the extent of the solar system to be not the heliopause, which the *Voyager 2* probe recently passed, but a more distant region at about one light year, where the Sun’s gravity is greatly diminished. This expanded definition therefore sweeps in a myriad of very interesting objects.

The book starts with some basic concepts, such as the scale of the solar system, types of objects and so on, before working through the major objects in the solar system starting at the Sun and working out to beyond the Kuiper Belt. The information on each object can be confined to just one page (e.g.

Saturn's moon Titan) or a number of pages. For example, our Moon has eight pages. However, each text page gives information on one thing only (e.g. the Tycho crater) and preserves the functionality of being able to dip in out of the book. Despite the limited room for text, the author alerts the reader to the differences in opinion about astronomical objects, such as theories about the origin of the Moon.

This is a really useful little book that would appeal to those interested in astronomy. As mentioned earlier, it can be dipped into and read in whatever order takes the reader's interest. It brings together a wealth of information that would take many hours to find on the internet, and does not need recharging or a good network connection.

Alex Chaplin



The Universe Explained: A Cosmic Q & A

Heather Couper and Nigel Henbest
Ontario: Firefly Books, 2018
288 pp. £16.95
ISBN 978 0 2281 0082 9

The intention of the authors in this book is to answer some of the questions that people might ask about the universe. The questions posed are a fairly good representative sample of the types of questions asked by school

and college students as well as non-scientist colleagues.

The book is divided into 14 broad chapters ranging from 'Sky Sights' to 'Alien Life' and in between covering all the major astronomical objects and ideas. Each chapter then consists of a number of questions that might be asked by a layperson or student. There are too many questions to go into detail, but, as an example I found the answer to '*What happened to the Russian space dogs?*' very poignant.

The layout consists of the question and answer either presented as a single page or spread over two facing pages. The clear text is mainly supported by coloured photographs, or in some cases diagrams, which have some link to the question posed. The overall effect is to make an attractive looking book. The writing, as one would expect from such well-known authors, is clear and authoritative but at the same time approachable and not too technical.

The strength of the book is that it can be read in any order depending on the interests of the reader or their prior knowledge. This is probably a good book for a school/college library or to give as a present or prize.

Alex Chaplin

Hasselblad & the Moon Landing

Deborah Ireland
Lewes: Ammonite Press, 2018
96 pp. £9.99
ISBN 978 1 78145 334 6

This is an engaging little book but it is woefully short: it took me less than an hour to read. It is well written, however, and the history of the Hasselblad camera and how it came to be used on the Apollo missions is interesting. The Hasselblad was originally developed for the Royal Swedish Air Force for surveillance



photography during the Second World War. After the war it became the camera of choice for top fashion photographers. The astronaut Wally Schirra ensured that the camera was adopted by NASA on the final two Mercury missions as well as all Gemini and Apollo missions. The science is limited: I wanted to know more about the thinking behind the modifications made to the cameras for use on the lunar surface.

The square format of the book neatly echoes the shape of the negatives that recorded the images. It is as wide as A4 paper but two-thirds the height. I imagine that a bigger format would have been prohibitively expensive but larger photographs would have looked even more stunning. The final 40% of the book consists of coffee-table style photographs arranged in chronological order on one page and quotes from the *Apollo 11* mission logs on the facing page. The photographs include the iconic Earthrise and the popular 'visor shot' of Aldrin. Discussion of the conspiracy theories that have dogged the Moon landings runs to just two pages (about 500 words). Anyone hoping to read a well-argued refutation of tomes such as *Dark Moon* by Mary Bennett and David Percy will be sorely disappointed.

Mike Follows



The Astronaut Selection Test Book: Do You Have What it Takes for Space?

Tim Peake and The European Space Agency

London: Century Books, 2018

256 pp. £20.00

ISBN 978 1 78089 918 3

Of the 100 billion people who have ever lived, Tim Peake is one of only 557 people to have travelled to space. But the number of astronauts is likely to increase exponentially with short hops to the International Space Station replaced by longer transits to Mars and beyond. This book makes it clear that future astronauts will

need a broader skillset than that possessed by the fast-jet test pilots favoured in the past. The tests are accessible so will instil in younger readers the confidence that they could reach the interview stage (and maybe leave some older ones wondering what might have been). Every school library should have at least one copy.

The reality is that over half the applicants will be turned away on medical grounds, and many more based on their psychological profile. This book would be a useful resource for those in charge of careers advice: many of the tests are like those used by graduate recruiters and the salutary warning is given that a significant number of applicants are not even invited to take those tests – because they lacked attention to detail in their applications. There is little doubt I would have flunked the linguistic aptitude test, but other tests were remarkably simple: a key stage 4 (age 14–16) physics student should be capable of doing well on test 5 (starting on page 26), the only one that assessed scientific (physics) knowledge and its application. As a science teacher I might be tempted to incorporate into a lesson one of

the logic and reasoning tests listed on pages 146 to 165.

There are a few revelations. For example, astronaut training would not be complete without a centrifuge, which is used to teach astronauts to cope with g-forces, but it was a revelation to me that it does not induce nausea. There are some interesting insights beyond the tests, including the research into the psychological impact of extended space missions. Tim Peake suggests that potential astronauts need a high level of self-awareness, of their relative strengths and weaknesses. They also need a growth mindset: to see failure as an opportunity to learn and develop. One of those involved in the Mars-500 project, a human experiment to simulate a return mission to Mars, suggests that selectors look for people with common sense, who are optimistic and creative – people who can bounce back from setbacks and who can productively fill empty transit time with few resources to hand. Of course, these are traits that many employers crave so perhaps this book should be required reading for all our youngsters.

Mike Follows

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Sarah Wood teaches biology in North West London.

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The *original* dual-scale, quality system of molecular and atomic models

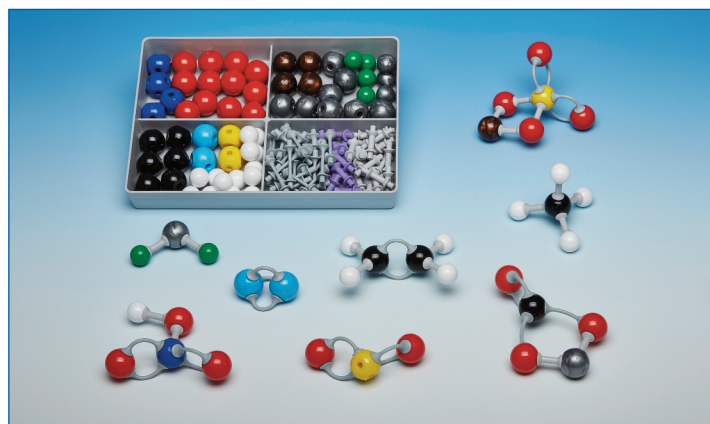
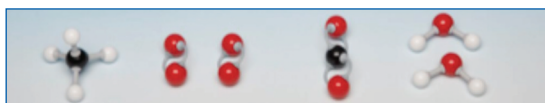
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Molecular Model Set for Biological Science

Art. Ref: MMS-033 - Advanced Level Biology

Contents: 34 Atoms and 88 links

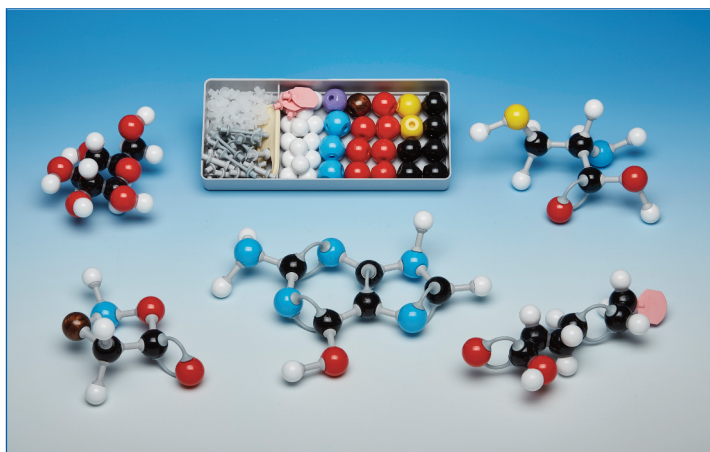
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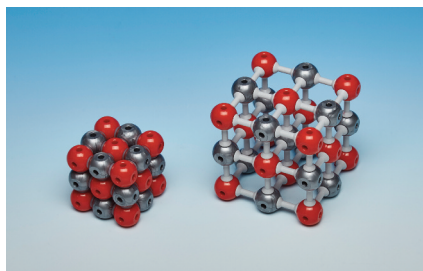


Additional New items for 2018

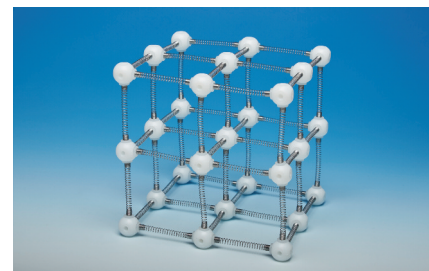
Self assembly Inorganic Crystal Kits: Diamond Clear model; Metal Oxide lattice and Vibrating Atoms kit



MKO-100-30-Clr
Clear Diamond model 30 atoms



MKO-150-27 Metal Oxide
(MgO / FeO) Crystal Lattice



MVAM-27-UN
Vibrating atoms kit