

# SCIENCE DEMONSTRATIONS, EXPERIMENTS, AND RESOURCES

## A reference list for elementary through college teachers emphasizing chemistry with some physics and life science

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compiled by

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Author's note: This is a work in progress. Updating will be continuing on this reference list through the future on an irregular schedule. Since the original publication of this article, many of these books have gone out of print and a number of publishers have gone out of business or have been bought out by other publishing houses. The publishers and list of publishers has not been updated from the 1991 article, however, it is easy to check current address or status of publishers through the Internet.

Some science supply companies, such as S17 Science and Supplies (S17science.com) and Flinn Scientific Co., stock some of these books, including a few titles that are out-of-print. Contact them directly for copies of their catalogs. Search for out-of-print books using the Internet and a search engine such as Google. Another source of out-of-print books is Amazon.com, they do not stock out-of-print books, but will do a book search if you request a copy.

## 1. JOURNALS

Journals will usually require membership in or affiliation with a professional organization. Many libraries, especially college libraries in schools which offer degrees in education, will often have these journals available. Addresses of professional organizations and journal and book publishers are listed at the end of this compilation.

*Science and Children*, National Science Teachers Association.

Designed for elementary and middle school science teaching. Contains activities, projects, program reports, reviews, hints, sky charts, background articles, and more.

*Science Scope*, National Science Teachers Association.

Designed for middle/junior high school science teachers. Particularly strong in activity-oriented articles along with information articles and news items.

*The Science Teacher*, National Science Teachers Association.

Designed for junior and senior high school science teachers. Contains demonstrations, experiments, sources of free or inexpensive teaching materials, reviews, posters, and other teaching ideas.

*The Journal of College Science Teaching*, National Science Teachers Association.

Designed for college science teachers. Main focus is on educational issues, and innovative techniques with some experiments and demonstrations.

*The Journal of Chemical Education*, Division of Chemical Education, American Chemical Society.

Designed for high school and college chemistry teachers. Covers all areas of chemistry through principles, innovative techniques, experiments, and demonstrations. Of particular note is the “Tested Demonstration” Column. (Indices are available in booklet form or on diskette.)

*ChemMatters*, Office of High School Chemistry, American Chemical Society.

Designed for high school students. Contains activities and articles focusing on chemistry of everyday things. All back issues are available on CD-ROM from the American Chemical Society Office of Education.

*Chemunity*, Office of High School Chemistry, American Chemical Society.

Designed for high school teachers. Contains articles of interest along with news of workshops and special programs for teachers.

*WonderScience*, Office of Pre-High School Chemistry, American Chemical Society.

This excellent magazine is no longer in print. It was aimed at elementary and middle school students. Activities youngsters can do at home with the assistance of an adult. Utilizes household materials. Well illustrated. Back copies are compiled in two books titled *The Best of WonderScience*, available from The American Chemical Society Office of Education.

*The Physics Teacher*, American Association of Physics Teachers.

Designed for high school and college physics teachers. Articles on principles, innovative techniques, experiments, and demonstrations.

*Chem 13 News*, Department of Chemistry, University of Waterloo.

For high school chemistry teachers. General articles, experiments, demonstrations, humor, and reviews of books and apparatus.

*Scientific American*, Scientific American, Inc.

*The Amateur Scientist* column by C. L. Strong, Jearl Walker and others, usually contains advanced projects suitable for high school or above. Worth browsing through in the library as it may often contain some interesting information suitable for pre-high school classes. All the *Amateur Scientist* columns are available on CD-ROM.

*Chemistry*, American Chemical Society (out of print)

This should be available in a library. Of particular interest is the “Lab Bench” column. (Available in reprint as “Lab Bench Experiments in Chemistry”.)

## 2. BOOKS

Source books for experiments, activities, demonstrations, and information. Many books duplicate activities found in others with variations in set-up and applications. Activities can be modified to be applicable to any level and materials and apparatus can often be simplified. Addresses of publishers are listed at the end of this compilation.

Alexander, Allison, and Bower, Susie, *Science Magic*; Prentice-Hall, 1986.

19 experiments, using common materials, designed for youngsters 4 to 8 years old with parental guidance. Topics include heat, light, mirrors, water works, and sound. Each experiment is well illustrated with brief explanations of the science behind it.

Allison, Linda, and Katz, David, *Gee, Wiz! How to Mix Art and Science or The Art of Thinking Scientifically*; The Yolla Bolly Press, 1983.

Written for children and adults. Contains experiments in science that use everyday materials along with clear and simple explanations. This is an excellent source of projects.

Alyea and Dutton, *Tested Demonstrations in Chemistry*, 7th Ed; Journal of Chemical Education.

This is the “Bible” for Chemical Demonstrations. Some are suitable for elementary school, but most are for middle school or above. You should have some knowledge of chemistry. Mostly outlines of demonstrations, including how to make up solutions, with little or no explanation, but well referenced to the *Journal of Chemical Education*. Has little safety information other than occasional “Caution” statements. A number of demonstrations are dangerous and care should be exercised in selection. (Note: This book has been updated by George Gilbert, with better explanations and safety information. See the entry under George’s name.)

Alyea, Hubert, *TOPS in General Chemistry*, 3rd Ed.; Journal of Chemical Education.

Experiments for projecting with an overhead projector. Use with Alyea’s inclined plane, build a special adapter, or use petri dishes instead of Alyea’s cells.

Alyea, Hubert, *Micro-Chemistry Projected*, 2nd Ed; Tops.

Companion to TOPS book. More micro experiments to project for your classes.

Alyea, Hubert, *Armchair Chemistry*, 2nd Ed; Tops.

How to put a chemistry lab in the hands of each student. Once set up, this can provide many student experiments at low cost. (This is the original “microscale” chemistry book. Alyea was decades ahead of everyone in bringing hands-on chemistry into the classroom.)

Amery, Heather, *The Know How Book of Experiments*; Usborne, 1977.

A well illustrated collection of safe and simple physical science experiments for youngsters to do at home. Utilizes lots of common materials. Tells why each experiment works and includes interesting facts and - applications.

Amery, Heather, and Littler, Angela, *The Know How Book of Batteries and Magnets*; Usborne, 1975.

A well illustrated collection of safe and simple electrical (battery powered) activities making games and models for youngsters, ages 7 to 12. Utilizes common materials, but does require a trip to an electronics or hardware store.

Barr, George, *Science Projects for Young People*; Dover, 1986.

A reprint of the 1964 edition. Projects intended for elementary school children using household materials. Topics include light and color, electricity and magnetism, water and earth science, air and weather, sound, chemistry, plants, animals, and science in the home.

Barr, George, *Science Tricks and Magic for Young People*; Dover, 1987.

A reprint of the 1968 edition. Twenty-four scientific tricks, using common materials, involving air pressure, electricity, liquids, light, heat, motion, and more.

Becker, Bob, *20 Demonstrations Guaranteed to Knock Your Socks Off!*, Flinn Scientific 1993.

Available with an accompanying video, Bob Becker shows how to prepare and perform 20 exciting demonstrations.

Becker, Bob, *20 Demonstrations Guaranteed to Knock Your Socks Off! Volume II*, Flinn Scientific 1993.

Available with an accompanying video, Bob Becker shows how to prepare and perform an additional 20 exciting demonstrations.

Berry, Donna A., *A Potpourri of Physics Teaching Ideas*; AAPT, 1987.

Selected reprints from *The Physics Teacher*, April 1963-December 1986. Articles include explanations of phenomena and everyday things, construction projects, demonstrations, and class activities requiring apparatus ranging from simple to complex. Appears best suited for middle school thru college, but many ideas useful for elementary teachers.

Bohren, Craig F., *Clouds in a Glass of Beer*; Wiley, 1987.

Explanations of atmospheric physics with over 25 experiments to observe or reproduce natural phenomena.

- Borgford, Christie L., and Summerlin, Lee R., *Chemical Activities*; ACS, 1988.  
Laboratory activities in many areas of chemistry for junior high and high school students. Each experiment includes step-by-step directions and some questions. For explanations, obtain the Teacher Edition.
- Brin, Susannah, and Sundquist, Nancy, *50 Science Experiments I Can Do*; Price Stern Sloan, 1988.  
50 experiments for children with air, bubbles, color, chemistry, insects, light, plants, rocks and minerals, weather, and more using common materials. Most experiments are simple, but a few should have adult supervision.
- Brown, Bob, *More Science for You - 112 Illustrated Experiments*; Tab, 1988.  
Experiments with vision, motion, weight, surface tension, temperature, sound, light, magic, and other topics. Each experiment briefly lists the problem, materials needed, what to do, and an answer or explanation with an illustration, all on one page. Adult supervision recommended.
- Brown, Robert J., *333 Science Tricks and Experiments*; Tab, 1984.  
A collection of science tricks and experiments in many areas taken from the author's syndicated column "Science For You"
- Brown, Robert J., *333 More Science Tricks and Experiments*; Tab, 1984.  
More tricks and experiments from Brown's "Science For You" column.
- Brown, Robert J., *200 Illustrated Science Experiments for Children*; Tab, 1987.  
Experiments and projects with air, sound, water, surface tension, mechanics, chemistry, light, heat, biology, electricity and magnetism, and more. Recommended for children with adult supervision.
- Brown, Sam Ed, *Bubbles, Rainbows, and Worms*; Gryphon House, 1981.  
A well organized book of science experiments for pre-school children using air, animals, the environment, plants, senses, water, and more. Each section contains a listing of relevant books for children.
- Caney, Steven, *Steven Caney's Invention Book*; Workman, 1985.  
Describes many inventions such as Life Savers, Chocolate Chip Cookies, Levi's, and more. Some projects are included. Great source book for class discussions.
- Caney, Steven, *Steven Caney's Play Book*; Workman, 1975.  
Contains over 70 games and projects using inexpensive materials. Make balloon rockets, boomerangs, solar heaters, sun clocks, roll back cans, salt gardens, and more. **Hazard Alert:** Directions for The Wave Machine call for alcohol and paint thinner. This is a fire/explosion hazard. Substitute mineral oil and water.
- Caney, Steven, *Steven Caney's Toy Book*; Workman, 1972.  
Describes how to make toys using everyday materials. This includes many science toys such as a water lens, barometer, tube telephone, a movie wheel and more.
- Carson, Mary Stetten, *The Scientific Kid*; Harper & Row, 1989.  
Thirty-five experiments for elementary school youngsters, some requiring adult assistance, covering a wide range of activities in the physical and biological sciences. Each activity contains step by step illustrated directions and is accompanied by a photograph.
- Catherall, Ed, *Adhesion*; Wayland, 1983.  
Investigations into viscous liquids, adhesion, and adhesives in nature for youngsters using common materials. Twenty-nine illustrated experiments ask lots of questions to be answered by observations and offer a few brief explanations when needed.

- Catherall, Ed, *Elasticity*; Wayland, 1983.  
Investigations into stretching materials, elastic materials, and springs, for youngsters using common materials. Twenty-nine illustrated experiments ask lots of questions to be answered by observations and offer a few brief explanations when needed.
- Catherall, Ed, *Friction*; Wayland, 1983.  
Investigations into slopes, friction, and reducing friction for youngsters using common materials occasionally requiring some construction of apparatus. Twenty-nine illustrated experiments ask lots of questions to be answered by observations and offer a few brief explanations when needed.
- Chen, Philip S., *Entertaining and Educational Chemical Demonstrations*; Chemical Elements, 1974.  
Knowledge of chemistry is needed. Some pyrotechnics demonstrations included without adequate safety information.
- Chisholm, Jane and Johnson, Mary, *Introduction to Chemistry*; Usborne, 1983.  
An illustrated introduction to chemistry for youngsters. It explains concepts of atoms and molecules, valency, chemical reactions, along with some chemistry of everyday things. Some experiments, but only general directions.
- Cobb, Vicki, and Darling, Kathy, *Bet You Can!*; Avon, 1983.  
A collection of science tricks you can do with simple explanations. Covers chemistry, physics and math.
- Cobb, Vicki, and Darling, Kathy, *Bet You Can't!*; Avon, 1980.  
A collection of science tricks you can't do. Covers chemistry, physics and math.
- Cobb, Vicki, *Chemically Active*; Lippincott, New York, 1985  
A collection of chemical experiments using materials found at home combined with explanations of chemical principles.
- Cobb, Vicki, *Fuzz Does It*; Lippincott, 1982.  
Easy to do experiments with animal fuzz, plant fuzz, fuzz from webs and cocoons, fibers, and more. Contains a simple fiber identification chart.
- Cobb, Vicki, *Gobs of Goo*; Lippincott, 1983.  
Easy to do experiments with goo using household materials. Includes mayonnaise, flour and water, starch and water, egg whites, and other goeey things.
- Cobb, Vicki, *The Secret Life of Hardware*; Lippincott, 1982.  
Science experiments with cleaners, polishes, waxes, paints, rope, glue, tools, and electricity. Each section explains how things were invented and why things work.
- Cook, James G., and The Thomas Alva Edison Foundation, *The Thomas Edison Book of Easy and Incredible Experiments*; Wiley, 1988.  
A wide range of experiments for youngsters ranging from elementary through high school. Experiments cover chemistry, electrochemistry, electricity, magnetism, solar energy, nuclear science, and more. Items to build include a phonograph, a pinhole camera, an electric pencil, a radio, a Geiger counter, and more. Also contains a bibliography of books for information and additional experiments.
- Disney, Walt, *Simple Science*; Bantam, 1986.  
Using a storybook format, a walk with Snow White introduces scientific principles about the weather, seasons, insects, birds, plants and trees. A second story uses Mickey Mouse to introduce principles and activity ideas on sound, taste, magnets, and plants. Applicable to pre-school up to about 2nd grade.

- Edge, R. D., *String & Sticky Tape Experiments*; AAPT, 1987.  
Over 150 experiments in physics utilizing rubber bands, cellulose tape, paper clips, drinking straws, and other common materials. Experiments cover all fields of physics and are indexed as to applicable level (elementary thru university), degree of difficulty, and qualitative vs quantitative.
- Ehrlich, Robert, *Turning the World Inside Out*; Princeton, 1990.  
A collection of physics demonstrations covering motion, gravity, friction, fluids, heat, waves, electricity, - magnetism, and more. Contains an index of those with surprising results, relative cost factors, need for - overhead projector, need construction, and relative time.
- Forte, Imogene, *Science Fun*; Incentive, 1985.  
Divided into three sections, investigating, exploring, and experimenting, this book attempts to help youngsters appreciate the science in everyday life. Some experiments should have adult supervision.
- Freier, G. D. and Anderson, F. J., *A Demonstration Handbook for Physics*, 2nd Edition; AAPT, 1981.  
A handbook of physics demonstrations for high school and college teachers. Each demonstration is briefly described and illustrated.
- Gardner, Martin, *Entertaining Science Experiments with Everyday Objects*; Dover, 1981.  
Experiments in chemistry, physics, psychology, physiology, astronomy and math.
- Gardner, Robert, *Kitchen Chemistry*; Messner, 1988.  
Chemistry experiments with liquids, solids and gases which can be performed in the kitchen “laboratory”, at home, using common materials. Some experiments utilize kitchen appliances such as the refrigerator for cooling (ice experiments), and the stove for heating.
- Gardner, Robert, *Science Around the House*; Messner, 1985.  
Simple experiments for youngsters with household materials. Activities include balancing objects, weighing, density, evaporation, relative humidity, gravity, forces, and light.
- Gilbert, George, Hubert N. alyea, Frederic B. Dutton, and Dale Dreisbach, *Tested Demonstrations in Chemistry*, Volume 1, published by arrangement with the Journal of Chemical Education, Division of Chemical Education, Inc., American Chemical Society, 1994.  
George Gilbert undertook a monumental task of updating the classic *Tested Demonstrations in Chemistry* and succeeded. The old demonstration abstracts have been expanded and safety information updated.
- Gilbert, George, Hubert N. alyea, Frederic B. Dutton, and Dale Dreisbach, *Tested Demonstrations in Chemistry*, Volume 2, published by arrangement with the Journal of Chemical Education, Division of Chemical Education, Inc., American Chemical Society, 1994.  
The second half of George Gilbert’s successful updating of the classic *Tested Demonstrations in Chemistry*. The old demonstration abstracts have been expanded and safety information updated
- Graf, Rudolf F., *Safe and Simple Electrical Experiments*; Dover, 1964.  
Well organized and illustrated experiments on static electricity, magnetism and current electricity. All experiments use safe and inexpensive materials.
- Gross, George R., Borislav Bilash II, , and John K. Koob, *A Demo A Day Volume 2 – Another Year of Chemical Demonstrations*, Flinn Scientific, 1998.  
Almost 200 additional demonstrations intended to be presented on a daily basis.
- Gross, George R., Borislav Bilash II, , and John K. Koob, *A Demo A Day – A Year of Chemical Demonstrations*, Flinn Scientific, 1995.  
174 demonstrations intended to be presented on a daily basis.

- Herbert, Don, *Mr. Wizard's Supermarket Science*; Random House, 1980.  
Over 100 experiments using materials available from your local supermarket. An excellent source of projects.
- Herbert, Don, and Ruchlis, Hy, *Mr. Wizard's 400 Experiments in Science*; Book-Lab, North Bergen, New Jersey, 1968. (Revised 1983 by David Goldberg)  
Experiments in chemistry, physics, and living things, organized by topic using commonly available materials.
- Herbert, Don, *Mr. Wizard's Experiments for Young Scientists*; Doubleday, 1959.  
Some of these experiments appear in the two Mr. Wizard books listed above. Contains 13 chapters, each being a single project with explanations.
- Herr, Norman, and James Cunningham, *Hands-on Chemistry Activities with Real-Life Applications*, Jossey-Bass, 1999.  
Over 300 investigations, demonstrations, lab experiments, and classroom activities aimed for 8-12<sup>th</sup> grade.
- Hoffman, Jane, *The Original Backyard Scientist*; Backyard Scientist, 1987.  
Ten investigations in chemistry and physics for youngsters, ages 4 through 12, with adult supervision. Each investigation is designed as a mystery with several "cases" to be solved.
- Hoffman, Jane, *Backyard Scientist, Series Two*; Backyard Scientist, 1987.  
Twenty-five investigations in chemistry and physics for youngsters, ages 9 through 14, with adult supervision. Each investigation is designed as a mystery with several "cases" to be solved.
- Holden, Alan, and Singer, Phylis, *Crystals and Crystal Growing*; Anchor Books, 1960.  
This is the classic book on crystals. Explanation of the theory and practice of crystallography with detailed methods for producing crystals with readily available materials.
- Humphreys, David, *Demonstrating Chemistry*; Humphreys, 1983.  
Suitable for advance middle school or above. Knowledge of chemistry and laboratory materials needed.
- Inflate-O, Dr., *Superloon's Amazing Balloon Book*; Greenleaf, 1988.  
Probably the most complete balloon book available. Covers basic balloon-ology, simple toys that can be build, balloon tricks, balloon forms, balloon crafts, balloon games, and balloon powered devices. Available as part of a "Balloon Kit" which contains balloons and all materials to build the balloon-powered devices in the balloon book.
- Johnson, Mary, *Chemistry Experiments*; Usborne, 1981.  
Safe science experiments using chemicals and equipment found at home. Gives information on setting up the experiment along with clear instructions and straightforward explanations. Nicely illustrated.
- Kent, Amanda and Ward, Alan, *Introduction to Physics*; Usborne, 1983.  
An illustrated introduction to physics for youngsters with simple explanations on light, color, magnetism, heat, air, optics, electricity, and sound. Contains a number of simple experiments.
- Lanners, Edi, *Secrets of 123 Classic Science Tricks and Experiments*; Tab, 1981.  
Based on parlor tricks and scientific curiosities popular at the end of the 19th century with illustrations patterned after wood engravings. Projects and tricks involve centrifugal force, inertia, gravity, light, optical illusions, and more.
- Levenson, Elaine, *Teaching Children About Science*; Prentice-Hall, 1985.  
Ideas and activities with sound, light, air and water, magnetism, static electricity, and more. Each section discusses the general background, contains lists of materials, procedures, and fine points to be discussed with children. Lists of children's books and resource books are included.

- Lien, Tik L., *Invitations to Science Inquiry*, 2nd Edition; Science Inquiry, 1987.  
An extensive compilation of demonstrations and activities on air, weather, properties of matter, energy, heat, magnetism, electricity, light, sound, forces, and living things. Lists all materials, procedure, pre- and post-activity questions, and brief explanations for each demonstration.
- Lippy, John Jr. and Palder, Edward L., *Modern Chemical Magic*; Angriff.  
A wide variety of magic with chemicals. Many are safe such as magic with liquids, fun with dry ice, and invisible inks. Sections on pyrotechnics do not contain adequate warnings and are dangerous.
- Mandell, Muriel, *Physics Experiments for Children*; Dover, 1968.  
103 experiments for students ranging from upper grade school to high school with air, water, mechanical energy, heat, sound, light, and electricity and magnetism. Experiments are arranged by topic.
- Math, Irwin, *Wires and Watts*; Aladdin, 1981.  
This book explains the fundamentals of electricity, tells about sources of electricity for experiments, and how to measure electricity with home-built devices. Projects include building a lamp, electromagnets, an electric motor, alarms, and more.
- McDonald, Bob, and Grace, Eric, *Wonderstruck*; CBC, 1988,  
Activities that answer questions inspired by kids who watch the TV show *Wonderstruck*. Activities include air pressure, rocket propulsion, plants, light, surface tension, static electricity, surface tension, and more using household materials. Indexed.
- McDonald, Bob, and Grace, Eric, *Wonderstruck II*; CBC, 1989,  
More activities that answer questions inspired by kids who watch the TV show *Wonderstruck*. Activities include thixotropic mixtures, acids and bases, water clocks, corrosion, pressure, taste, sound, light, and more using household materials. Indexed.
- McGill, Ormond, *Science Magic: 101 Experiments You Can Do*; Prentice Hall, 1984.  
Experiments with magnetism, numbers, chemistry, dry ice, and physics presented as magic tricks that can be performed using commonly available materials.
- Mebane, Robert C. and Rybolt, Thomas R., *Adventures with Atoms and Molecules*; Enslow, 1985.  
30 experiments in chemistry using everyday things. Simple discussion with each experiment with some applications to modern problems.
- Mebane, Robert C. and Rybolt, Thomas R., *Adventures with Atoms and Molecules Book II*; Enslow, 1987.  
30 more experiments in chemistry using everyday things with suggestions for 66 additional activities. Simple discussion with each experiment with some applications to everyday phenomena.
- Mullin, Virginia L., *Chemistry Experiments for Children*; Dover, 1962.  
40 experiments on chemicals in the air, water, solutions, diffusion and osmosis, crystals, fire, acids and bases, photography, and everyday things.
- National Science Teachers Association, *Polymer Chemistry*; NSTA, 1986.  
A teaching package for pre-college teachers that explains about polymers and how to teach about polymers with 33 laboratory experiments and demonstrations. Most of the experiments will require a laboratory setting.
- Ontario Science Centre, *Scienceworks*; Addison-Wesley, 1984.  
Sixty five experiments, puzzles, or projects in science using everyday materials. Each experiment has a section that explains what is going on or how it works.
- Palder, Edward, *Chemistry Magic*; Woodbine House, 1987.  
146 chemistry experiments for ages 9 and up. Many chemicals needed come from drug stores, supermarkets, hardware, and hobby shops. Includes some safety information. Each experiment encourages keeping notes during experiments.



- Penrose, Gordon, *Magic Mud and Other Great Experiments*; Simon and Schuster, 1987.  
21 science activities from Dr. Zed of OWL/TV using common household materials. Make mini boomerangs, magic mud (Oobleck), jelly pops, a wind wheel, crystal pops (rock candy), chocolate chip meringues, and more.
- Press, Hans Jürgen, *Simple Science Experiments*; Discovery Toys, (Originally printed by Otto Maier Verlag - Ravensburg), 1967.  
204 experiments using everyday things in astronomy, chemistry, physics, and botany. Experiments are brief and concise with illustrations and very brief explanations.
- Prochnow, Dave, *Superconductivity, Experimenting in a New Technology*; Tab, 1989.  
The text tells about the development of superconductivity, the superconducting elements, the theory of superconductivity, and instructions for making a superconductor. Also includes a good bibliography. - Recommended for high school level or above.
- Provenzo, Eugene F. Jr., and Provenzo, Asterie Baker, *47 Easy-To-Do Classic Science Experiments*; Dover, 1989.  
Experiments for grade school children from 19th and early 20th century books, each accompanied by an historical illustration. Arranged by topics, the experiments include surface tension, air pressure, optics, static electricity, magnetism, inertia, sound, gravity, topology, light, geometry, mechanics, heat, and chemical absorption.
- Rohrig, Brian, *150 Captivating Chemistry Experiments Using Household Substances*, (and other titles) Fizzbang Science  
Brian has several books using household materials for science experiments, making Slime, etc. His goal is to make science fun with common materials, often with many variations on a theme. His entire list of books and materials are available on his web site [fizzbange.science.com](http://fizzbange.science.com).
- Sarquis, Mickey and Jerry Sarquis, *Fun With Chemistry: A Guidebook of K-12 Activities from the Institute for Chemical Education*, Volume 1. Institute for Chemical Education, 1991.  
This is the first volume of demonstrations and activities used for the ICE Summer Institutes for teacher which ran from 1984 to 1997. Topics include carbon dioxide, color changes, chemistry with foodstuffs, density, from the five and dime, and more.
- Sarquis, Mickey and Jerry Sarquis, *Fun With Chemistry: A Guidebook of K-12 Activities from the Institute for Chemical Education*, Volume 2. Institute for Chemical Education, 1993.  
The second volume of demonstrations and activities used for the ICE Summer Institutes for teacher continues with topics colorful separations, polymers, Cartesian divers, physical properties and changes, crystals and more.
- Shakhashiri, Bassam Z., *Chemical Demonstrations, Vol. 1*; Wisconsin, 1983.  
Detailed descriptions of chemical demonstrations with complete explanations. This volume contains demonstrations on thermochemistry, chemiluminescence, polymers, and color and equilibria of metal ion precipitates and complexes
- Shakhashiri, Bassam Z., *Chemical Demonstrations, Vol. 2*; Wisconsin, 1985.  
This volume contains demonstrations on physical and chemical behavior of gases and on oscillating chemical reactions.
- Shakhashiri, Bassam Z., *Chemical Demonstrations, Vol. 3*; Wisconsin, 1989.  
This volume contains demonstrations on acids and bases, liquids, solutions, and colloids.
- Shakhashiri, Bassam Z., *Chemical Demonstrations, Vol. 4*; Wisconsin, 1989.  
This volume contains demonstrations on clock reactions and electrochemistry..

- Shalit, Nathan, *Cup and Saucer Chemistry*; Dover, 1983.  
About 40 chemical experiments for youngsters with easy to follow directions. Uses common household materials. A few experiments may require parental supervision.
- Shalit, Nathan, *Science Magic Tricks*; Holt, 1981.  
Over 50 safe, simple magic tricks based on the elementary laws of math, chemistry, optical illusions, and magnetism. Uses everyday items found around the house.
- Smithsonian Family Learning Project, *Science Activity Book*; Galison, 1987.  
Family oriented science projects involving fingerprints, solar energy, making cheese, bubbles, magnets, plant pigments, crystals, sound, and more. Each project includes clear instructions and simple explanations.
- Smithsonian Institution, *More Science Activities*; Galison, 1988.  
Science activities involving making ginger ale, boats, stroboscopes, paper airplanes, bird feeders, soil, - kaleidoscopes, compressed air rockets, marbled paper, and more. Each project includes clear instructions and simple explanations.
- Smithsonian Institution, *Still More Science Activities*; Galison, 1989.  
Science activities involving star tracking, sundials, timers, whistles and flutes, chromatography, brine shrimp, terrariums, solar energy, straws, cooking, and more. Each project includes clear instructions and simple explanations.
- Sprung, Barbara, Froschl, Merle, and Campbell, Patricia B., *What Will Happen If...: Young Children and the Scientific Method*; Educational Equity, 1985.  
A teachers' guide to incorporation of math, science, and technology-related activities in the elementary school classroom. Includes activities on water and sand flow through sieves, momentum with ramps and balls, exploring density, solubility and viscosity, and machines.
- Stangl, Jean, *The Tools of Science*; Dodd, Mead, 1987.  
Subtitled "Ideas and Activities for Guiding Young Scientists", this book is aimed at the teacher or parent who wants to provide hands-on activities for youngsters. The focus is on the physical sciences, occasionally utilizing everyday materials. Many activities are similar to those found in other books in this list.
- Stein, Sara, *The Science Book*; Workman, 1979.  
Not as experiment oriented as other books in this list, but it contains a great deal of information with a good index. This will be useful in finding answers to questions in many areas of science.
- Stetten, Mary, *Let's Play Science*; Harper & Row, 1979.  
Science experiments for preschool and elementary school youngsters. Experiments involve growing things, the senses, light, air, balances, pulleys, magnets, water, and easy to care for pets.
- Strongin, Herb, *Science on a Shoestring*; Addison-Wesley, 1976.  
Science projects for K-12 with emphasis on the lower grades. Uses everyday materials. If you only get one book, this is the book to buy.
- Summerlin, Lee R. and Ealy, James L. Jr., *Chemical Demonstrations. A Sourcebook for Teachers*, Second Edition; ACS, 1988.  
108 demonstrations in many areas of chemistry which includes information on set up, teaching tips, and - questions for students. Does not explain the principles of most of the demos. Some demos on smoke, fire and explosions are unsuitable for classes. Very little safety information included.
- Summerlin, Lee R., Borgford, Christie L., and Ealy, Julie B., *Chemical Demonstrations. A Sourcebook for Teachers, Volume 2*, Second Edition; ACS, 1988.  
112 more demonstrations in many areas of chemistry. Similar to Volume 1. Short on explanations and safety information.

- Talesnick, Irwin, *Idea Bank Collation*; S17 Science Supplies, 1984.  
A compilation of the IDEA BANK from THE CRUCIBLE and *The Science Teacher*. A wealth of information in Biology, Chemistry, Earth Science, General Science, and Physics.
- Tocci, Salvatore, *Chemistry Around You*; Arco, 1985.  
Experiments and projects with everyday chemicals. Divided by sections of the house: kitchen, bathroom, laundry room, garage, and backyard. Also contains some computer programs for analysis of data.
- UNESCO, *700 Science Experiments for Everyone*; Doubleday, 1962.  
Experiments with plants, animals, rocks and minerals, astronomy, air, weather, water, machines, physics, and the human body.
- VanCleave, Janice Pratt, *Chemistry for Every Kid*; Wiley, 1989.  
101 chemistry experiments with common materials concerning matter, forces, gases, chemical changes, phase changes, solutions, heat, and acids and bases. Each experiment lists materials needed, a simplified procedure, the results, and a brief explanation. Experiments call for adult supervision when needed.
- VanCleave, Janice Pratt, *Teaching the Fun of Physics*; Prentice Hall, 1985.  
101 experiments with heat, electricity, gravity, magnetism, surface tension, and more. Each experiment - contains step by step instructions, the results, and an explanation. Also contains a section on science fair projects.
- Vivian, Charles, *Science Experiments & Amusements for Children*; Dover, 1963  
73 experiments that can be performed by children with limited parental supervision. Uses household materials.
- Walpole, Brenda, *175 Science Experiments to Amuse and Amaze Your Friends*; Random House, 1988.  
A well illustrated collection of facts, experiments, tricks, and things to make dealing with water, air, movement, and light for elementary school youngsters. Some activities require parental assistance (but not always prominently marked). Each section concludes with a short one-page quiz on some material from that section.
- Waters, Gaby, *Science Surprises*; Usborne, 1985.  
Simple science experiments with unexpected results for youngsters. Includes frost patterns, wind power, static electricity, air, liquids, and more.
- Waters, Gaby, *Science Tricks & Magic*; Usborne, 1985.  
Simple science experiments youngsters. Includes growing beans, coloring flowers, shadows, magnets, sound, red cabbage indicator, and more.
- Watson, Philip, *Light Fantastic*; Lothrop, 1982.  
Experiments with light, mirror images, colour, artificial light, and photography. Well illustrated with step by step instructions.
- Watson, Philip, *Liquid Magic*; Lothrop, 1982.  
Experiments with liquids, density, chromatography, surface tension, phase changes and crystals. Well illustrated with step by step instructions.
- Watson, Philip, *Super Motion*; Lothrop, 1982.  
Experiments with vibrations and sound, spinning motion, natural rhythm, balancing, and magnets. Well illustrated with step by step directions.
- Williams, Robert A., Rockwell, Robert E., and Sherwood, Elizabeth A., *Mudpies to Magnets*; Gryphon, 1987.  
Activities for youngsters from age 2 and up using commonly available materials. Activities are grouped into chapters based on classroom arrangement and curriculum planning. Each activity includes a materials list, a vocabulary list, and ideas for further investigation.

Wood, Elizabeth A., *Science From Your Airplane Window*, Second Revised Edition; Dover, 1975.

This book explains the things that happen during an airplane ride. An excellent reason to request a window seat on your next flight.

Wyler, Rose, *Science Fun with a Homemade Chemistry Set*; Messner, 1987.

Experiments for youngsters using household materials to build up a chemistry set. Activities include making glue, growing crystals, acids and bases, oxygen, carbon dioxide, and more.

Zakia, Richard D., and Todd, Hollis N., *101 Experiments in Photography*; Morgan & Morgan, 1969.

Experiments in all areas of photography.

Zubrowski, Bernie, *Ball-Point Pens*; Little, Brown, 1979.

This books examines ball point pens through a series of activities that demonstrate how they work. It also includes activities using pen parts to make a thermometer, a short interval timer, and more.

Zubrowski, Bernie, *Messing Around with Drinking Straw Construction*; Little, Brown, 1981.

Building activities using drinking straws, paper clips and pins to construct a "house" frame, and a bridge. Includes instructions on testing structures for strength and relates them to actual buildings and bridges.

Zubrowski, Bernie, *Messing Around With Water Pumps and Siphons*; Little, Brown, 1981

Activities involve building and using pumps and siphons to move liquids around. Relates activities to similar processes in nature and technology.

**NOTE:** In addition to these books, look through science laboratory manuals for all levels. Do not overlook high school and freshman college chemistry and elementary organic chemistry laboratory manuals. You will often find experiments that can be easily adapted, either whole or in parts, for demonstrations or projects.

Some textbook companies have demonstration and activity supplements for their textbooks. Check individual textbooks.

## Some Out-of Print Demonstration/Experiment Books

There are a great number of out-of-print demonstration books that contain useful and interesting demonstrations and experiments. Sometimes they are interesting just for their woodcuts or illustrations, or to compare older concepts with modern ones. These may be found in school or public libraries, at used book stores, garage sales, or other used book sales. A word of caution, safety considerations were generally not a part of many experiments or demonstrations. The reader should take care in attempting any experiments that produce smokes, sparks, or explosions. Such experiments should be checked against modern safety manuals.

Davison, H. F., *A Collection of Chemical Lecture Experiments*; The Chemical Catalog Company, Inc., 1926.

Chemical demonstrations with colloids, air, solubility, ammonia, time reactions, activities of elements, and more. Experiments require a chemical laboratory. Some hazardous experiments.

Ford, Leonard A., *Chemical Magic*; T. S. Denison & Company, Inc., 1959.

Classic demonstrations that make quick color changes, liquids that defy gravity, magic ink, a chemical garden, and more. A number of experiments that make unexpected explosions, and fires that light mysteriously utilize hazardous materials and/or procedures and should not be attempted. (May be available from magic shops.)

Fowles, G., *Lecture Experiments in Chemistry*; The Blakiston Company, 1937, 1939, and 1947.

A chemical demonstration book that requires a chemical laboratory. Demonstration topics involve water and air, acids, bases, and salts, sulfur, the halogens, phosphorus, and silicon, and quantitative experiments. Many demonstrations are considered safety hazards today.

Gibson, Charles R., *Chemical Amusements and Experiments*; Seeley, Service & Co. Limited, 1933.

Experiments with hydrogen, oxygen, chlorine, carbon dioxide, metals, crystal growing, nitrogen, candles, and more. Originally written for boys and girls, many of these experiments are best performed in a laboratory.

Swezey, Kenneth, *After-Dinner Science*; McGraw-Hill, 1948.

Illustrated experiments involving air, aerodynamics, water, temperature, gravity, forces, sound, light and mirrors, electricity and magnetism, optical illusions, and chemistry. Some experiments require materials that may no longer be readily available in local stores.

Swezey, Kenneth, *Science Magic*; McGraw-Hill, 1952.

Illustrated experiments involving jets, gravity, inertia, surface tension, fluid mechanics, sound, static - electricity, magnets, heat, cold, light, and chemistry. Some experiments require materials that may no longer be readily available in local stores.

**GEMS** (Great Explorations in Math and Science). A publication series that includes Teacher's Guides, Assembly Presenter's Guides, and Exhibit Guides produced at the Lawrence Hall of Science. These contain tested demonstrations that do not require special training or a background in science. Each activity lists all materials needed, skills developed, themes, and complete directions from preparation to clean-up. Available from Lawrence Hall of Science, University of California, Berkeley, CA 94720; or call (415) 642-7771. Some volumes in the GEMS series, in the areas of physical science are listed below.

Agler, Leigh, *Liquid Explorations*; GEMS, 1987.

A series of activities exploring liquids and their properties for grades K-3. Study patterns of color in liquids, liquid drops, make an ocean in a bottle and salad dressings.

Ahouse, Jeremy John, *Fingerprinting*; GEMS, 1987.

Exploring and classifying fingerprints to solve a crime for grades 4-8.

Barber, Jacqueline, *Bubble-ology*; GEMS, (See the section on Bubbles)

Barber, Jacqueline, *Chemical Reactions*; GEMS, 1986.

A teacher's guide for the investigation of chemical reactions for grades 7-10. Mix chemicals that produce heat, gas, color change, and an odor in a Ziploc bag.

Barber, Jacqueline, *Crime Lab Chemistry*; GEMS, 1985.

A teacher's guide for solving a mystery for grades 4-8. Main activity centers on chromatography to discover which pen was used to write a ransom note.

Barber, Jacqueline, *Solids, Liquids, and Gases*; GEMS, 1986.

A presenter's guide for a school assembly program. Activities include properties of liquids, solids, and gases, phase changes, and the concept of atoms.

Barber, Jacqueline, *Vitamin C Testing*; GEMS, 1988.

Activities for grades 4-8 testing and titrating substances for vitamin C.

Buegler, Marion E., *Discovering Density*; GEMS, 1988.

Activities for grades 6-10 that develop the concept of density by layering liquids.

Gould, Alan, *Hot Water and Warm Homes from Sunlight*; GEMS, 1986.

Solar energy projects for grades 4-8. Build a model home and a hot water heater to study solar power.

- Gould, Alan, *Convection. A Current Event*; GEMS, 1988.  
Explorations of convection currents in liquids and in air for grades 6-9.
- Sneider, Cary I, *More than Magnifiers*; GEMS, 1988.  
Activities for grades 6-9 using lenses for magnifiers, to study cameras, make a telescope and a slide projector.
- Sneider, Cary I, *Oobleck: What Do Scientists Do?*; GEMS, 1985.  
A teacher's guide of activities with Oobleck, made from starch and water, for grades 4-8.
- Sneider, Cary I, and Barber, Jacqueline, *Paper Towel Testing*; GEMS, 1987.  
Activities testing absorbency and wet strength of paper towels for grades 5-9.
- Sneider, Cary I, Gould, Alan, and Wentz, Budd, *The "Magic" of Electricity*; GEMS, 1985.  
A presenter's guide for a school assembly program on electricity for Grades 3-6. Electricity is made from a lemon juice cell, solar cells are demonstrated, a generator is made, static electricity is studied, and more.
- Sneider, Cary I, and Gould, Alan, *Height-O-Meters*; GEMS, 1988.  
Activities for grades 6-10 in measurement using a home made clinometer (height-o-meter) to determine the height of objects..

**Formula books, craft books, and cookbooks.** These books are written for a general audience and often use readily available materials. Many will provide addresses for suppliers of specialized chemicals. These are excellent sources for class experiments or projects.

## Soap Bubbles

- Barber, Jacqueline, *Bubble-ology*; GEMS, 1986.  
A teacher's guide of activities with bubbles for grades 6-9. Devise bubble blowing devices, test to see which soap makes the best bubbles, and make long lasting bubbles. Each activity lists all materials needed, skills developed, themes, and complete directions from preparation to clean-up.
- Boys, C. V., *Soap Bubbles*; Dover, 1959.  
A reprint of the 1911 edition. Everything you wanted to know about soap bubbles and surface tension. Many simple experiments and demonstrations are explained along with excellent engravings.
- Cassidy, John, with Stein, David, *The Unbelievable Bubble Book*; Klutz, 1987.  
This book accompanies David Stein's *Bubble Thing*. Includes recipes for bubbles, methods for making large bubbles, troubleshooting, homemade bubble machines, and additional bubble lore. Also included are articles on Bubble People.
- Faverty, Richard, with Javna, John, *Professor Bubbles' Official Bubble Handbook*; Greenleaf, 1987.  
Information about bubbles, bubble wands, and other bubble toys. Includes recipes for bubble solutions and instructions for all kinds of bubble tricks.
- Isenberg, Cyril, *The Science of Soap Films and Soap Bubbles*, Dover, 1992.  
Good discussions of the molecular basis for soap bubbles. A more mathematical treatment of soap bubbles and films than Boys' book with some excellent color plates.
- Noddy, Tom, *Tom Noddy's Bubble Magic*; Running Press, 1988.  
Using commercial "bubble juice", Tom Noddy explains how to do many bubble tricks such as caterpillar bubbles, a bubble carousel, and more. Brief explanations of what bubbles are and why they behave as they do.

Rämme, Göram, *Soap Bubbles in Art and Education*, Science Culture Technology Publishing, Singapore, 1998.  
A well illustrated book, with many excellent photographs, which is a collection of papers published by the author. Covers topics such as bursting bubbles, colors of soap films, soap film models, modeling the atom with soap bubbles, and more.

Stevens, Peter S., *Patterns in Nature*, Little, Brown and Co., 1974.  
Chapter 7 of this book examines the mathematics of soap bubbles. Well illustrated and readable.

Zubrowski, Bernie, *Bubbles*, Little, Brown and Company, 1979.  
Activities with bubbles including very big bubbles, soap-film curves, geometric shapes, domes, bubble building blocks, and more. Does not give specific recipes, but encourages experimenting with making bubble solutions.

## **Cooking and Cookbooks:**

Brown, Alton, *I'm Just Here For the Food*, Stewart, Tabori & Chang  
A cookbook based on Brown's *Good Eats* television show, on the Food Network, Brown tells the lore and science behind cooking in an interesting and lighthearted manner.

Cobb, Vicki, *Science Experiments You Can Eat*; Lippincott, 1972.  
A collection of experiments with food covering everything from acids and bases through popping popcorn to yeast.

Cobb, Vicki, *More Science Experiments You Can Eat*; Lippincott, 1979.  
More experiments with food taking up where the previous volume left off.

Corriher, Shirley O., *CookWise*, William Morrow and Co., Inc., 1997.  
A cookbook with explanations of the science behind the recipes. An excellent companion to McGee's *On Food and Cooking*.

Coultate, Tom P., *Food - The Chemistry of Its Components*; RSC, 1984.  
Intended for teachers, this book gives a detailed account of the chemistry of the principle substances of which food is composed. It examines carbohydrates, lipids, proteins, colours, flavours, vitamins, and preservatives.

Grosser, Arthur E., *The Cook Book Decoder or Culinary Alchemy Explained*; Beaufort, Inc, 1981.  
This book aims to explain the thinking behind recipes. Contains over twenty experiments (autodemonstrations) to explain how cooking works.

Hillman, Howard, *Kitchen Science*; Houghton Mifflin, 1981.  
Examines cooking equipment, cooking methods, and all aspects of foods such as meats, seafoods, dairy products, thickeners, seasonings, and more through a series of questions and answers. Includes a bibliography of books on food and cooking for further reading.

Hobson, Phyllis, *Making Homemade Cheeses & Butter*; Garden Way, 1973.  
Concise directions for making a wide range of cheeses both hard and soft.

McGee, Harold, *On Food and Cooking*; Scribner, 2005 (First edition, 1984)  
Written for the general public, this book covers a wide area of culinary lore and scientific explanation and updated and expanded in 2005. No experiments as in Grosser's or Cobb's books, but an excellent source of information.

McGee, Harold, *The Cuious Cook*; Collier books, Macmillan Publishing Co., 1990

Written for the general public, this book is a follow-up to *On Food and Cooking*. This book describes experiments by McGee as he tests a number of culinary procedures and myths.

Ontario Science Centre, *Foodworks*; Kids Can Press, 1986.

Information and activities on food. Investigates what food is, what it does, and how it does it.

Rosenthal, Sylvia, and Shinagel, Fran, *How Cooking Works*; Macmillan, 1981.

A kitchen handbook and cookbook that explains why certain techniques and practices are used in the kitchen. Written for a general audience

Waxter, Julia B., *The Science Cookbook*; Fearon, 1981.

A collection of experiment-recipes that teach science and nutrition. Front half of book explains each project listing vocabulary, materials, discussion questions, and related activities. Experiment pages in back half of book are duplicatable for class use.

Zubrowski, Bernie, *Messing Around with Baking Chemistry*; Little, Brown, 1981.

Concerned with the chemistry of cake and bread making, this book varies recipes and investigates the various ingredients used in cakes and breads to see how they work. Simple household materials are used for the experiments.

## **Cosmetics:**

Cobb, Vicki, *The Secret Life of Cosmetics*; Lippincott, 1985.

Information and experiments on soap and toothpaste, lotions and creams, fragrances, hair, and makeup.

NOTE: Two experiments dealing with cosmetics appear in Jones, Johnston, Netterville, Wood, and Joesten, *Laboratory Manual for Chemistry & Society*, Fifth Edition; Saunders, 1987. One experiment deals with the preparation of a face cream and the determination of the effects of its components, and the other is a qualitative analysis of a commercial face powder.

## **Dyeing:**

Brooklyn Botanical Garden, *Natural Plant Dyeing, A Handbook*; Brooklyn Botanic Garden, 1973.

This is a reprinted special edition of *Plants & Gardens*, 1973, 29 (2) containing articles on plants and mordants, the chemistry of dyeing, and classroom applications. Several color plates are included.

Kramer, Jack, *Natural Dyes: Plants and Processes*; Scribner, 1972.

The chapters in this book follow the dyeing process from preparing the fibers, to mordants, to collecting the dye material, to the dyer's garden, and to dye recipes. Contains color charts in the appendix.

NOTE 1: Some experiments with chemical dyes such as malachite green, indigo blue, and para red can be found in Jones, Netterville, Johnston, and Wood, *Laboratory Manual for Chemistry, Man, and Society*, Second Edition; Saunders, 1976. This experiment also appears in Jones, Johnston, Netterville, Wood, and Joesten, *Laboratory Manual for Chemistry & Society*, Fifth Edition; Saunders, 1987, with the para red developed dyeing omitted.

NOTE 2: For a really interesting experiment on dyeing, write to Testfabrics, Inc., 415 Delaware Avenue, PO Box # 26, West Pittston, PA 18643. Ask for information about their multifiber fabric (13 different fibers on one strip) and their T.I.S. Identification Stains.



## Household items:

Henley, A., *Henley's Twentieth Century Book of Ten Thousand Formulas, Processes, and Trade Secrets*; Gordon, 1986. (Also available under the title *Henley's Formulas for Home and Workshop*)

Contains over 10,000 scientific formulas, trade secrets, food and chemical recipes, and money saving ideas. Some required materials may be difficult to find. Not updated for safety. Still a useful reference book.

Stark, Norman, *The Formula Book*; Sheed & Ward, 1975.

This book, along with its companion volumes (listed below), gives recipes for making all sorts of personal care, animal care, garden and household products.

Stark, Norman, *The Formula Book 2*; Sheed Andrews, 1976.

Nigh, Edward and Stark Research Associates, *The Formula Book 3*; Sheed Andrews and McMeel, Inc., 1978.

## Soaps and Candles:

Bramson, Ann, *Soap*; Workman, 1975.

A complete book on soapmaking with information on ingredients, preparation, recipes, problems, special soaps, scenting, colors, and molding.

Hobson, Phyllis, *Making Homemade Soaps and Candles*; Garden Way, 1974.

Recipes for making a wide range of soaps including special soaps, perfumed soaps, and medicated soaps. Also, tells materials and methods for candlemaking.

**Paper Airplanes and Kites** are another area where a class can have a lot of fun while learning about the principles of aerodynamics. Consider the possibility of a paper airplane contest. A chance to fly paper airplanes in class without getting into trouble.

Baker, Arthur, *Cut & Assemble Paper Airplanes That Fly*; Dover, 1982.

Eight full color aerodynamically sound paper airplanes ready to be cut out and assembled. With complete instructions.

Botermans, Jack, *Paper Flight*; Holt, 1984.

Complete directions for making 48 different paper airplanes that fly.

Grater, Michael, *Cut & Fold Extraterrestrial Invaders That Fly*; Dover, 1983.

Twenty-two full-color spaceships that are easy to assemble and fly. Complete instructions are included.

Hunt, Leslie L., *25 Kites That Fly*; Dover, 1971.

Information and instructions on building a wide range of kites.

Ito, Dr. Toshio, and Komura, Hirotugu, *Kites. The Science and the Wonder*; Japan, 1983.

A guide to making kites with scientific explanations of different kite designs. It covers the aerodynamics of kites, stability, kite dynamics, kite materials, designs, and flying information.

Johnson, Michael, and Austin, Alan, *Paper Planes*; Grafton, 1988.

Punch out and assemble flying models of a Blackburn Monoplane, Fokker DR1 Triplane, Siai-Marchetti S55 Flying Boat, Ryan NYP "Spirit of St. Louis" Monoplane, Hawker Hart Biplane, and more. Contains descriptive historic text, photographs, and detailed assembly drawings for all models

Kawami, David, *Cut & Assemble UFO's That Fly*; Dover, 1985.

Eight full color models ready to be cut out and assembled. With complete instructions.

Kline, Richard, *The Ultimate Paper Airplane*; Simon and Schuster, 1985.

Patterns and instructions for making seven different models of the paper airplane that is supposed to have outdistanced all the competition.

Mander, Jerry, Dipple, George, and Gossage, Howard, *The Great International Paper Airplane Book*; Simon & Schuster, 1967.

One of the best books on paper airplanes. Twenty different designs. Xerox a page and let the students cut and fold many novel airplanes. Look for the computer version of this book, you can print out designs on your dot matrix printer.

Morris, Campbell, *The Best Paper Aircraft*; Perigee, 1986.

Diagrams and instructions for 28 airplanes ranging from easy to hard. Contains some unique designs such as the kamikaze water bomber.

Ninomiya, Yasuaki, *Whitewings*; AG, 1986.

Different sets are available consisting of cut and assemble paper airplanes, assembly and flight instructions, and all necessary parts except glue. Contains enough information to get a youngster involved and design information for advanced individuals.

The Editors of Science 86, *THE Paper Airplane Book*; Vintage, 1985.

The official book of the second great international paper airplane contest. More great designs.

Weiss, Stephen, *Wings and Things: Origami That Flies*; St. Martin's, 1984.

Diagrams and directions for making 32 origami models that fly without cutting, gluing, taping, or weighting. Contains unique designs in shape of a bat, a seagull, a flying nun, and more.

**Things to Build** is another area of teaching science. There has been a recent series of books on building devices that really work out of paper. All projects involve cutting parts out of the book and assembling them, so you may want to purchase several copies of the book. Review each project carefully to assess its level of difficulty. These make excellent student projects.

Hawcock, David, *Bare Bones, Everybody's Inside Out*; Facts on File, 1986.

Construct an adult female skeleton, two-thirds life size from twenty labeled ready-to-cut-out pieces. Accompanied by a booklet, "All About Bone", a 30-inch chart, and complete instructions.

Hawcock, David, *Paper Dinosaurs*; Sterling, 1988.

A collection of plans to make 20 dinosaurs from paper. Each plan includes a color photograph, a list of materials, and step by step instructions. Plans must be scaled up to make the dinosaurs.

Holland, Peter, *Amazing Models - Balloon Power*; Tab, 1989.

Build twelve balloon powered models of jets, engines, and more from balsa wood, paper clips, drinking straws, old ballpoint pens, and other common materials. Full sized drawings are included in each project. Projects require some careful cutting and assembly.

Holland, Peter, *Amazing Models - Rubber Band Power*; Tab, 1989.

Build twelve rubber band powered models of a dragster, a pogo rocket, a jump jet, and more from balsa wood, paper clips, drinking straws, old ballpoint pens, and other common materials. Full sized drawings are included in each project. Projects require some careful cutting and assembly.

Inflate-O, Dr., *Superloon's Amazing Balloon Book*; Greenleaf, 1988.

See description under this author in the book section (page 6).

- Jenkins, Gerald, and Bear, Magdalen, *The Sixth Stellation of the Icosahedron*; Tarquin, 1985.  
An advanced mathematical model of a polygon with 120 faces to cut out and glue together. Paper is precolored with 10 colors to show symmetry.
- Jenkins, Gerald, and Bear, Magdalen, *The Compound of Five Cubes*; Tarquin, 1985.  
An advanced mathematical model of five intersecting cubes resulting in a polyhedron with 360 faces to cut out and glue together. Paper is precolored with 5 colors which occur 72 times and show the symmetry.
- Jenkins, Gerald, and Bear, Magdalen, *The Final Stellation of the Icosahedron*; Tarquin, 1985.  
An advanced mathematical model of a polyhedron with 60 spikes and a total of 180 faces to cut out and glue together. The paper is colored with 20 colors, each which defines a plane surface.
- McCormack, Alan, *Inventors Workshop*; Fearon, 1981.  
More than 25 projects and activities for elementary and middle school using common materials. Build a pushrod box, a candle-powered steamboat, a magnetic dancer, a bubble machine, a water clock, and more.
- Moskowitz, Joel, *The Working Piston Engine*; Simon and Schuster, 1986.  
Build a working model of a steam engine out of paper. All the parts are precut and colored.
- Robbins, Alan, *Cut and Construct You Own Brontosaurus*; Ballantine, 1988.  
Cut out and assemble a brontosaurus over three feet long. Parts are large making this a fairly simple kit.
- Rudolph, James Smith, *Make Your Own Working Paper Clock*; Harper and Row, 1983.  
Build a working clock out of paper by cutting the book into 160 pieces and gluing them together. Requires careful cutting and patience.
- Wickware, Kyle, *Make Your Own Working Paper Locomotive*; Harper and Row, 1986.  
Build a working steam locomotive powered by a balloon with detailed instructions. All parts are pre-colored.
- Wickware, Kyle, *Make Your Own Working Paper Steam Engine*; Harper and Row, 1986.  
Build a working steam engine air powered by a balloon with detailed instructions. All parts are pre-colored.

## Information Books

These books do not contain experiments or demonstrations. They do contain information that is useful in teaching such as origins of terms, phrases, inventions, etc...

- Cotterill, Rodney, *The Cambridge Guide to the Material World*; Cambridge, 1985.  
A non-mathematical account of the physics, chemistry, and biology of materials in the terrestrial environment from atoms to polymers and from cells to humans.
- Elias, Hans-Georg, *Mega Molecules*; Springer-Verlag, 1987.  
Written for a general readership, this lightly-technical book looks at macromolecules in plastics, adhesives, corn syrup, vanilla sauces, fibers, and more.
- Feldman, David, *Imponderables*; Quill, 1987.  
Explanations of everyday mysteries of life that aren't very important. These cover a range of material from why pistachios are dyed red to why we don't ever see baby pigeons. Some serious, some fun.
- Feldman, David, *When Do Fish Sleep? and Other Imponderables of Everyday Life*; Harper & Row, 1989.  
Explanations of everyday mysteries of life that aren't very important. These cover a range of material from how caloric values of food are measured to why barns are red. Some serious, some fun.

- Feldman, David, *Why Do Clocks Run Clockwise? and Other Imponderables*; Harper & Row, 1987.  
More explanations of everyday mysteries of life. These cover a range of material from warning labels on mattresses to the sparkles observed when opening a Curad bandage in the dark. Some serious, some fun.
- Fisher, David, and Bragonier, Reginald, Jr., *What's What*; Hammond, 1981.  
A visual glossary of the physical world. Learn the names of the parts of over 1500 objects, animals, and the earth.
- Macaulay, David, *The Way Things Work*; Houghton Mifflin, 1988.  
No experiments, just a well illustrated visual guide to the workings of hundreds of machines and devices. Also shows connections between different devices.
- Marsh, Ken, *The Way the New Technology Works*; Simon and Schuster, 1982.  
Clear, simple explanations of how modern technology works.
- National Science Resources Center, *Science for Children, Resources for Teachers*; National Academy Press, 1988.  
A listing of curriculum materials, supplementary resources, and sources of information for teachers. Includes grade level and brief description along with sources and prices.
- Saul, Wendy, and Newman, Alan R., *Science Fare*; Harper and Row, 1986.  
An illustrated guide and catalog of toys, books, and activities for kids. Tips, suggestions, and evaluations of microscopes, chemistry sets, telescopes, models, and more.
- Scientific American, *The Physics of Everyday Phenomena*; Freeman, 1979.  
A collection of papers from Scientific American on the growth of snow crystals, the shape of raindrops, fog, why the sea is salt, and more.
- Selinger, Ben, *Chemistry in the Market Place*, 4th Ed. or later; Harcourt, Brace, Jovanovich Group (Australia), - (Available from ACS in U.S.), 1989.  
A book on consumer chemistry with emphasis on household products and the chemistry needed to understand them. Limited experiments, but a wealth of information.
- Taylor, Barbara, *Be An Inventor*; Harcourt, 1987.  
A *Weekly Reader* book all about being an inventor. Tells about inventions, how to get started, patents, selling your invention, and where to get help with inventions.
- Walker, Jearl, *Roundabout*; Freeman, 1985.  
Reading from Walker's "The Amateur Scientist" column in Scientific American, on the physics of rotation in the everyday world. Tops, boomerangs, amusement parks, and more.
- Wood, Elizabeth A., *Crystals and Light*, Second Revised Edition; Dover, 1977.  
This book contains no projects, just a clear description of about the behavior of light in crystals for people with no previous training.

## Information Books on Food

- Blanshard, J. M. V., Frazier, P. J., and Galliard, T., Editors, *Chemistry and Physics of Baking*; RSC, 1986.  
The proceedings of a 1985 international symposium organized by the Food and Chemistry Group of The Royal Society of Chemistry and the School of Agriculture of the University of Nottingham. This technical book contains information on some of the basic constituents of baked products, interactions that occur in mixing and heating, and some developments in processes and products. There are no experiments or activities

Harris, Marvin, *The Sacred Cow and the Abominable Pig*; Touchstone, 1985.  
A look at food habits of different cultures.

Rinzler, Carol Ann, *The Complete Book of Food*; World Almanac, 1987.  
A nutritional, medical, and culinary guide arranged by ingredient. For each item it lists a nutritional profile, the most nutritional way to serve it, buying it, storing it, preparing it, what happens when you cook it, how processing affects it, medical considerations, and more.

Root, Waverley, *Food*; Fireside, 1980.  
An illustrated history and dictionary of the foods. Enjoyable reading about names, preparations, mythology, religious uses, and more.

## Information Books on the Physics of Sports

Frohlich, Cliff, Editor, *Physics of Sports*; AAPT, 1986.  
A collection of reprints from selected physics journals dealing with baseball, bowling, basketball, golf, tennis, running, and more. The first paper in the book contains a bibliography of 100 articles on the physics of sports. Papers are technical, recommended for high school or college.

Griffing, David F., *The Dynamics of Sports*; 3rd Ed., Dalog, 1987.  
This is a textbook designed for Griffing's college course on the physics of sports, but it is useful to high school and middle school teachers with some physics background. Clearly written and not overly technical.

**Pyrotechnics** has always fascinated people with beautiful displays of light, sound and color. This is not an area for the inexperienced since there are many dangers in working with these materials at all stages from initial starting materials through storage of prepared materials. These substances are unstable and can explode or burst into flame for no apparent reason. Remember, even the professionals have accidents.

These are not recipe books. This section is provided for information only to find out about the properties of these materials and how they work. Pyrotechnics should not be used in a classroom or in a demonstration program. Even with commercially available materials one may consider to be "safe", follow directions for their use, use only small amounts, with proper shielding, proper fire protection apparatus, and away from anything that is flammable. Even the slightest confinement of a pyrotechnical material may result in an explosion. All unused materials should be rendered harmless and disposed of, never stored.

Conkling, John A., *Chemistry of Pyrotechnics*; Dekker, 1985.  
This book explains the chemistry of the components and reactions involved in pyrotechnic mixtures and explosives. An excellent reference.

Davis, Tenney L., *The Chemistry of Powder and Explosives*; Angriff, 1943.  
One of the first major books on the chemistry of powder and explosives. Written for chemists to explain the modes of behavior of these materials.

McLain, Joseph Howard, *Pyrotechnics*; Erlbaum, 1980.  
A look at pyrotechnics from the viewpoint of solid state chemistry.

## PROFESSIONAL ASSOCIATIONS AND ORGANIZATIONS

(Check the Internet for recent addresses and contact information)

**American Association of Physics Teachers**, 5112 Berwyn Road, College Park, MD 20740.

**American Chemical Society**, 1155 16th Street, NW, Washington DC 20036.

**National Science Teachers Association**, 1840 Wilson Blvd., Arlington, VA 22201.

**Royal Society of Chemistry**, Burlington House, London W1V 0BN, England.

## PUBLISHERS OF BOOKS AND JOURNALS

NOTE: A number of publishers have gone out of business or have been bought out by other publishing companies. Check Books in Print or do an Internet Search to confirm publishers' current address and/or availability of books.

**AAPT**: American Association of Physics Teachers, 5112 Berwyn Road, College Park, Maryland 20740.

**ACS**: American Chemical Society, 1155 16th Street, NW, Washington DC 20036.

**Addison-Wesley**: Addison-Wesley Publishing Company, Inc., 1 Jacob Way, Reading, MA 01867.

**AG**: AG Industries, Inc., 3832 148th Avenue, N.E., Redmond, WA 98052.

**Aladdin**: Aladdin Books, Macmillan Publishing Company, 866 Third Avenue, New York, NY 10022.

**Anchor**: Doubleday & Co., Inc., 666 Fifth Avenue, New York, NY 10103.

**Angriff**: Angriff Press, Box 2726, Hollywood, CA 90078.

**Arco**: Arco Publishing, Inc., Division of Simon & Schuster, 1 Gulf & Western Plaza, New York, NY 10023.

**Avon**: Avon Books, A division of The Hearst Corporation, 105 Madison Avenue, New York, NY 10016.

**Backyard Scientist**: Backyard Scientist/Jane Hoffman, Post Office Box 16966, Irvine, CA 92713.

**Ballantine**: Ballantine Books, a Division of Random House, Inc., 201 E. 50th Street, New York, NY 10022.

**Bantam**: Bantam Books, Inc., 666 Fifth Avenue, New York, NY 10103.

**Beaufort**: Beaufort Books, Inc., 226 W. 26th Street, New York, NY 10001.

**Book Lab**: Book Lab, 500 74th Street, North Bergen, NJ 07047.

**Cambridge**: Cambridge University Press, 40 West 20th Street, New York, NY 10011.

**CBC**: CBC Enterprises, a Division of the Canadian Broadcasting Corporation, P.O. Box 500, Station A, Toronto, Ontario M5W 1E6, Canada.

**CHEM 13 News**: CHEM 13 News, Department of Chemistry, University of Waterloo, Waterloo, Ontario, N2L 3G1, Canada

**Chem Ed**: Journal of Chemical Education, 20th and Northampton Sts., Easton, PA 18042.

**Chemical Elements:** Chemical Elements Publishing Co., 529 Mission Drive, Camarillo, CA 93010.

**Dalog:** The Dalog Company, P.O. Box 243, Oxford, OH 45056.

**Dekker:** Marcel Dekker, Inc., 270 Madison Avenue, New York, NY 10016.

**Discovery Toys** (via the Internet)

**Division of Chemical Education,** write to Journal of Chemical Education, Subscription Department, 20th and Northampton Sts., Easton, PA 18042.

**Dodd, Mead:** Dodd, Mead & Company, 71 Fifth Avenue, New York, NY 10003.

**Doubleday:** Doubleday & Co., Inc., 666 Fifth Avenue, New York, NY 10103.

**Dover:** Dover Publications, Inc., 31 East 2nd Street, Mineola, NY 11501.

**Education Equity:** Education Equity Concepts, Inc., 114 E. 32nd Street, Suite 306, New York, NY 10016.  
Distributor: Gryphon House, Inc.

**Enslow:** Enslow Publishers, Inc., Bloy Street & Ramsey Avenue, Box 777, Hillside, NJ 07205.

**Erlbaum:** Lawrence Erlbaum Associates, Inc., 365 Broadway, Hillsdale, NJ 07642.

**Facts on File:** Facts on File Publications, 460 Park Avenue South, New York, NY 10016.

**Fearon:** Fearon Teacher Aids, David S. Lake Publishers, 19 Davis Drive, Belmont, CA 94002.

**Fireside:** Fireside Books, Simon & Schuster, Inc., 1230 Avenue of the Americas, New York, NY 10020.

**Freeman:** W. H. Freeman and Company, 41 Madison Avenue, New York, NY 10010.

**Galison:** Galison Books, GMG Publishing, 25 W. 42nd Street, New York, NY 10036.

**Garden Way:** Garden Way Publishing, Charlotte, VT 05445.

**GEMS:** Lawrence Hall of Science, University of California, Berkeley, CA 94720.

**Gordon:** Gordon Press, P.O. Box 459, Bowling Green Station, New York, NY 10004.

**Grafton:** Grafton Books, A Division of the Collins Publishing Group, 8 Grafton Street, London W1X 3LA, England.

**Greenleaf:** Greenleaf Publishers, Depot Street, Schenevus, NY 12155.

**Gryphon:** Gryphon House, Inc., P.O. Box 275, Mt. Rainier, MD 20712.

**Hammond:** Hammond Incorporated, 515 Valley Street, Maplewood, NJ 07040.

**Harcourt:** Harcourt Brace Jovanovich, Publishers, 1250 Sixth Avenue, San Diego, CA 92101.

**Harper & Row:** Harper & Row, Publishers, 10 East 53rd Street, New York, NY 10022.

**Holt:** Holt, Rinehart and Winston, Inc., Division of Harcourt Brace Jovanovich, 301 Commerce Street, Suite 3700, Fort Worth, TX 76102.

**Houghton Mifflin:** Houghton Mifflin Company, 2 Park Street, Boston, MA 02108.

**Humphreys:** David Humphreys, Department of Chemistry, McMaster University, Hamilton, Ontario, Canada.

**Incentive:** Incentive Publications, Inc., 3835 Cleghorn Avenue, Nashville, TN 37215.

**Japan:** Japan Publications, Inc., Distributed in the U.S. by Harper & Row, Publishers.

**Kids Can Press:** Kids Can Press Ltd., 585½ Bloor Street West, Toronto, Ontario, Canada, M6G 1K5.

**Klutz:** Klutz Press, 2121 Staunton Street, Palo Alto, CA 94306.

**Lake:** David S. Lake Publishers, 500 Harbor Blvd., Belmont, CA 94002.

**LHS:** Lawrence Hall of Science, University of California, Berkeley, CA 94720.

**Lippincott:** J. B. Lippincott Co., subsidiary of Harper & Row Publishers, E. Washington Square, Philadelphia, PA 19105.

**Little, Brown:** Little, Brown & Co., Division of Time, Inc., 34 Beacon Street, Boston, MA 02108.

**Lothrop:** Lothrop, Lee & Shepard Books, a division of William Morrow & Company, Inc., 105 Madison Avenue, New York, NY 10016.

**Macmillan:** Macmillan Publishing Company, 866 Third Avenue, New York, NY 10022.

**Messner:** Julian Messner, A Division of Simon & Schuster, Inc., Simon and Schuster Building, Rockefeller Center, 1230 Avenue of the Americas, New York, NY 10020.

**Morgan & Morgan:** Morgan & Morgan Inc., 145 Palisade Street, Dobbs Ferry, NY 10522.

**Morrow:** William Morrow and Company, Inc., 105 Madison Avenue, New York, NY, 10016.

**National Academy Press:** National Academy Press, 2101 Constitution Avenue, NW, Washington, DC 20418.

**NSTA:** National Science Teachers Association, 1840 Wilson Blvd., Arlington, VA 22201

**Perigee:** Perigee Books, The Putnam Publishing Group, 200 Madison Avenue, New York, NY 10016.

**Prentice Hall:** Prentice Hall, A Division of Simon & Schuster, Inc., Rte 9W, Englewood Cliffs, NJ, 07632.

**Price Stern Sloan:** Price Stern Sloan, Inc., 360 North La Cienega Blvd., Los Angeles, CA 90048.

**Princeton:** Princeton University Press, 41 William Street Princeton, NJ, 08540.

**Quill:** Quill, William Morrow and Company, Inc., 105 Madison Avenue, New York, NY, 10016.

**Random House:** Random House, Inc., 201 E. 50th Street, 31st Floor, New York, NY 10022.

**RSC:** Royal Society of Chemistry, Burlington House, London W1V 0BN, England.

**Running Press:** Running Press Book Publishers, 125 South Twenty-second Street, Philadelphia, PA 19103.

**S17 Science Supplies:** S17 Science Supplies and Services Co. Ltd., Box 1591, Kingston, Ontario K7L 5C8, Canada.



**Saunders:** Saunders College Publishing, a division of Holt, Rinehart and Winston, Inc., E. Washington Square, Philadelphia, PA 19105.

**Science Inquiry:** Science Inquiry Enterprises, 505 W. Madison Ave, No. 12, El Cajon, CA 92020.

**Scientific American:** Scientific American Inc., 415 Madison Avenue, New York, NY 10017.

**Scribner:** Charles Scribner's Sons, 866 Third Avenue, New York, NY 10022.

**Sheed Andrews:** see Sheed and Ward.

**Sheed & Ward:** Sheed & Ward Inc., Division of National Catholic Reporter Publishing Co., Inc., P.O. Box 419492, Kansas City, MO 64141-4292.

**Simon & Schuster:** Simon & Schuster, Inc., 1230 Avenue of the Americas, New York, NY 10020.

**Springer-Verlag:** Springer-Verlag Inc., 175 Fifth Avenue, New York, NY 10010.

**St. Martin's:** St. Martin's Press, 175 Fifth Avenue, New York, NY 10010.

**Sterling:** Sterling Publishing Company., Inc., 387 Park Avenue, New York, NY, 10016-8810.

**Tab:** Tab Books Inc., Blue Ridge Summit, PA 17294-0850.

**Tarquin:** Tarquin Publications, Stradbroke, Diss, Norfolk IP21 5JP, England.

**Tops:** Tops-Alyea, 337 Harrison Street, Princeton, NJ 08540.

**Touchstone:** Touchstone Books, Simon & Schuster, Inc., 1230 Avenue of the Americas, New York, NY 10020.

**Usborne:** Usborne Publishing Ltd., 20 Garrick Street, London WC2 9BJ, England.

**Vintage:** Vintage Books, A Division of Random House, 201 E. 50th Street, 31st Floor, New York, NY 10022.

**Wayland:** Wayland Publishers Limited, 49 Lansdowne Place, Hove, East Sussex BN3 1HF, England.

**Wiley:** John Wiley & Sons, 605 Third Avenue, New York, NY, 10158-0012.

**Wisconsin:** University of Wisconsin Press, 114 North Murray Street, Madison, WI 53715.

**Woodbine House:** Woodbine House, 10400 Connecticut Avenue, Suite 512, Kensington, MD 20895.

**Workman:** Workman Publishing Company, Inc., 708 Broadway, New York, NY 10003.

**World Almanac:** An imprint of Pharos Books, A Scripps Howard Company, 200 Park Avenue, New York, NY 10166.

**Yolla Bolly Press:** The Yolla Bolly Press, Little, Brown & Company, 34 Beacon Street, Boston, MA 02108.