NOW you can plot X vs Y... automatically

A new Speedomax Recorder...

now automatically plots the relationship between two variables, showing one as a function of the other. Tedious compilation and manual plotting by experienced personnel are eliminated. Instead, the variables to be plotted are converted to d-c signals, and connected to the instrument, one to the horizontal axis and the other to the vertical axis. The result is a permanent record, accurately plotting in minutes data that would require hours using the point by point method.

As compared to the usual recorder, which has only one measuring circuit and a constant speed non-reversing chart paper drive and which plots a variable as a function of time, this new recorder has two measuring circuits. Pen travel (X axis) is controlled by our well known Speedomax G vacuum tube circuit. A similar circuit controls the chart paper drive, (Y axis) and makes it reversible. Thus, the new recorder makes it possible automatically to draw curves such as the hysteresis loop shown, temperature vs temperature difference, stress vs strain or other two-variable curves.

Response of the instrument is amply fast. The pen takes only 3 seconds for full scale travel of $9\frac{3}{8}"$. Full chart travel is $10"$ and requires 4 seconds. Standard minimum voltage for full travel of either coordinate is 10 mv.

For further information, write to Leeds & Northrup Company, 4926 Stenton Avenue, Philadelphia 44, Pennsylvania.

Standard minimum range is 10 mv d-c for full deflection of either function.
Two electronic circuits—one for each function.
Large chart: about 100 square inches.
What GENERAL ELECTRIC People are Saying

W. L. FLEISCHMANN
Apparatus Department

TURBINE ALLOYS: The application of alloy steels to high-temperature steam-turbine service relies on the accumulation of metallurgical data which are unique in some respects. Where it can usually be assumed that the properties of metals do not change, under the influence of high temperature continuous changes take place. Where ordinarily it is correct to assume that plastic deformation will occur only beyond a certain stress, at high temperatures even low loads cause constantly increasing deformation.

With a long-life turbine, the data obtained from laboratory tests are then in reality only guides which, by extrapolation, become the bases on which the alloy is formulated and the design stress set.

To allow extrapolation, one constantly has to search for indications which may be small in even a year-long test—but may become important in the long life of a turbine. Constant refinements in the test procedures and the theories of the mechanical and thermal behavior of metals under the influence of stress and temperature are, therefore, necessary to enable us to design the heat-resistant steels.

We are confident that this approach is sound, based upon the year-by-year improvement in thermal efficiency of turbines to 37 per cent, caused in no small measure by the average yearly advance of 12 F in steam temperature maintained for 40 years. These metallurgical developments benefit all of us, since, with the modern efficient turbines, the power industry is able to deliver electricity at low cost to the consumer.

Louisiana Engineering Society,
New Orleans,
January 13, 1950

R. O. FEHR
General Engineering & Consulting Laboratory

SOUND PLEASANTNESS: The pleasantness or unpleasantness of a sound determines if an equipment is acceptable from the acoustical standpoint. Sound intensity meters now being used in industry do not give this answer... they tell as much about the pleasantness of a noise as a light meter tells about the quality of a painting.

Instruments based on new concepts must be built. We believe that the ultimate will not be achieved in the near future, but we are well on the way to obtaining practical instruments which are far superior to anything we had several years ago.

American Society for Metals.
Terre Haute, Ind.
January 9, 1950

F. B. SCHNEIDER
Apparatus Department

CYCLONE DUST COLLECTORS: Independent of the design, all "cyclones," from the ancient centrifugal dust collectors to the modern vortex collector, suffer from a common handicap. This disadvantage is the large pressure drop caused by the whirling motion of the gas while performing the cleaning action. In addition, with higher dust-separation efficiency, the pressure drop increases, so that the highly efficient vortex collectors have a pressure drop which is a multiple of the pressure drop of the common centrifugal separators. Since the latter are mostly used in connection with the cleaning of large volumes of air, the power consumed is considerable, and even small reductions of the pressure will provide substantial savings of horsepower.

The pressure drop across cyclone dust collectors can be reduced by relatively simple means. A recovery of 75 percent can be attained on centrifugal separators by employing gradually enlarged tangential inlets together with cylindrical hoods at the outlet. The pressure drop across vortex collectors can be reduced by approximately 80 percent by using diverging inlets and recovery drums at the outlet which discharge clean air into ducts. If the vortex collectors discharge the air into the atmosphere, the pressure drop across them can be decreased by 34 percent with two concentric cones at the outlets, and by amounts up to 90 percent when these cones are combined with a diverging tangential inlet.

General Electric Review,
February, 1950.

You can put your confidence in

GENERAL ELECTRIC
Successful Textbooks For Successful Teaching

STILES
Handbook of Microscopic Characteristics of Tissues and Organs (3rd Edition)

This book helps students in the rapid recognition of tissues, and is widely used as a supplementary text, laboratory manual, and teacher's handbook for review. Sections on the cell, mitosis, development of bone, oral cavity, teeth, hair, etc., are included. New analytical illustrations and a glossary have also been inserted in this edition.

33 Illustrations, 214 Pages, $1.75

COLIN
Elements of Genetics (2nd Edition)

A textbook on genetics with special emphasis upon the application of the principles of Mendelian heredity to man and the roles played by heredity and environment. College students in biology taking lecture and laboratory courses in genetics will find that the interest and effectiveness of the book have been greatly enhanced by numerous new illustrations.

90 Illustrations, 402 Pages, $3.50

MEREDITH
Hygiene (4th Edition)

The aim of this book is to aid the student from the start to see the whole field of public health as a unit and to evaluate its various separate fields. Enough anatomy and physiology is included to give a background of the structure and function of the human body. The treatment from personal and public aspects of both mental and physical health make this a very effective text.

155 Illustrations, 838 Pages, $4.00

MEREDITH
Science of Health

This concise text presents a study of the problems concerned in the maintenance of health and an appreciation of the importance of the individual in the community from the health standpoint. Designed for a one-hour, one-semester college course, the emphasis is on nutrition, physical training, parenthood, child welfare, nervous disorders, mental hygiene, and personality adjustment.

138 Illustrations, 427 Pages, $3.00

SEND FOR YOUR EXAMINATION COPY

The Blakiston Company
1012 Walnut Street
Philadelphia 5, Pa.

Please send the books checked: charge my account []: my check is enclosed []. It is understood that you will credit my account in full for any books returned within 10 days.

[] Stiles' Handbook of Microscopic Characteristics of Tissues and Organs
[] Elements of Genetics
[] Meredith's Science of Health
[] Meredith's Hygiene

NAME __________________________ ADDRESS __________________________
CITY ___________________________ ZONE STATE _______________________

S 3-24-50
Table of Contents

The Proton Synchrotron: E. J. Lofgren ....... 295

The Comparative Biochemistry of Vitamin Function: Ernest Beerstecher, Jr. ....... 300

Technical Papers

Blossoming of Fruits Delayed by Maleic Hydrazide: David G. White .......... 303

Inhibition of the Shwartzman Phenomenon by Adrenocorticotropic Hormone (ACTH) from the Adenohypophysis:
Louis J. Soffer et al. .......... 303

A Simple Tissue Homogenizer:
Karl M. Wilbur and Max V. Skeen ........ 304

Certain Physical Properties of Some Substituted Diphenyl Sulfones and Sulfoxides:
E. D. Amstutz, J. J. Chessick, and I. M. Hunsberger .......... 305

Abundance of N\textsuperscript{15} in the Nitrogen Occluded in Radioactive Minerals:
William C. White and Herman Yagoda ....... 307

Growth of Chlorella vulgaris in the Dark:
Bernard J. Finkle, David Appleman, and Fritz K. Fleischer .......... 309

Studies on Pain: Arthur M. Schwartz, William K. Sata, and Daniel Laszlo ....... 310

Comments and Communications

Geologic Age from Metamict Minerals; A Modified Schiff's Solution; Dramamine ....... 312

Book Reviews

Atomic Medicine; Medical Etymology; Supersensitivity of Denervated Structures ....... 313

Scientific Book Register ....... 314

News and Notes ....... 315

---


Manuscripts submitted for publication should be sent to the Editorial Office, with stamped, self-addressed envelope enclosed for possible return. The AAAS assumes no responsibility for the safety of the manuscripts or for the opinions expressed by contributors.

Annual subscription, $7.50; single copies, $.25; foreign postage, outside the Pan-American Union, $1.00; Canadian postage, $.50. Remittances and orders for subscriptions and single copies should be sent to the Circulation Department, Science, 1515 Massachusetts Ave., N.W., Washington 5, D.C. Membership correspondence for the AAAS should be addressed to the Administrative Secretary at the same address.

Change of address. Four weeks' notice is required for change of address. This should be sent to Science Recorder, 1515 Massachusetts Ave., N.W., Washington 5, D.C. When ordering a change, it is necessary to furnish an address stencil label from a recent issue. Claims for a missing number will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers due to failure to notify the Circulation Department of a change of address or because an issue is missing from their files, or for any reason from subscribers in Central Europe, Asia, or the Pacific Islands (other than Hawaii).

The AAAS also publishes The Scientific Monthly. Subscription rates on request.
INTRODUCTION TO THE BACTERIA
By C. E. Clifton, Stanford University. In press
Offers an introduction to the nature and activities of bacteria with particular emphasis on the more common organisms which most directly influence the welfare of man. It compares bacteria with other micro-organisms as regards morphology and physiology, stresses the general biological and biochemical aspects, and illustrates the principles of microbial behavior.

ATOMIC PHYSICS
This well-known text covers the whole field of nuclear, atomic, molecular, and solid-state physics from the atomistic point of view, starting at a relatively low level and leading the reader to an understanding of all important empirical facts and theories and to a realization of the unsolved problems and trends of present-day research.

THE SCIENCE OF CHEMISTRY
By George W. Watt and Lewis F. Hatch, University of Texas. 566 pages, $4.50
This is the first chemistry text designed and written exclusively for the so-called "cultural" or "terminal" course. Sufficient emphasis is placed upon fundamentals and the applications of chemistry to give the student an understanding of the science. The text is unusual in that it includes organic chemistry, biological chemistry, agricultural chemistry, and medicinal chemistry. A supplementary volume, Chemical Laboratory Experiments, is available.

THE CHEMISTRY OF URANIUM
Containing a wealth of material applicable to the entire field of inorganic chemistry, this extensive critical treatise on the chemistry of uranium first considers the nuclear properties of uranium, the properties of the uranium atom, and the physical and chemical properties of the uranium metal. The authors then treat the intermetallic compounds and alloy systems of uranium, the uranium-hydrogen system, and uranium borides, carbides, and silicides. An extensive chapter deals with uranium oxides and hydroxides. Finally the text proceeds to a discussion of the non-volatile fluorides of uranium; uranium hexafluoride; uranium-chloride compounds; bromides, iodides, and pseudohalides of uranium, and uranium oxyhalides.

Send for copies on approval

330 West 42nd Street, New York 18, N. Y.
thoroughly clean pipettes ... at great savings in labor and breakage costs

Technicon

AUTOMATIC PIPETTE WASHER

In a few brief minutes, through its unique flush-action washing principle, The Technicon Pipette Washer delivers a full basket load (200 of 1 ml in 100th's) of scrupulously clean pipettes, ready for drying in the same basket. No handling of individual pipettes, no shifting from one container to another ... the entire process of cleansing, washing and drying is carried through without fuss or bother. We will be glad to send you a bulletin giving particulars of this remarkably efficient laboratory appliance.

THE TECHNICON COMPANY
215 East 149th Street - New York 51, N.Y.
FOR GREATEST EASE, SPEED, & CONVENIENCE IN MAKING

**pH, CHLORINE and PHOSPHATE DETERMINATIONS**

USE A

TAYLOR COMPARATOR

Illustrated is the Taylor T-O pH Comparator, basic set in the Taylor Line. To make a determination, place the reagent treated sample in the middle tube in the base, move the slide across until the colors match, and . . .

CONTINUING ACCURACY ASSURED BY GUARANTEE

All the color standards necessary for any one determination are enclosed within the sturdy molded plastic slide. This convenient arrangement eliminates loss and breakage of fragile single standards. Accuracy is assured because all Taylor Liquid Color Standards carry an unlimited guarantee against fading.

READY REFERENCE WORK FREE—

96 pages of authoritative information on 34 basic industries — all Taylor sets and methods. Write for your free copy—see your dealer for equipment.

**W. A. TAYLOR AND CO.**

416 RODGERS FORGE RD. • BALTIMORE-4, MD.

---

**Now available...**

Adenosine Triphosphate (ATP); Amygdalin; Amylase; Animal Lecithin; Ascorbic Acid Oxidase; Bacitracin; BAL; Biotin cryst.; Caffeic Acid; Carotene cryst.; Catalase; Cellulase; Chlorogenic Acid; Chorionic Gonadotropin; Circulatory Hormone; Colchicine; Cytidyl Acid; Cytochrome C; Dehydroascorbic Acid; Dihydroxyacetone; Dihydroxyphenylalanine (DOPA); Dipyridyli; Edestin; Emulsion; Erythritol; N-Ethylpiperidine; Fibroin; Folic Acid; Galactonuric Acid; Gentisic Acid; Girard Reagents P and T; Glialnin; Glucose Pentacacetate; Glucuronic Acid; Glyceraldehyde; Glyceric Acid; Heparin; Hordenine; Hylauronidase; 2-Hydroxydipaldehyde; Humulone; Isoascorbic Acid; Isopropylstarchester; Kojic Acid; Kynurenic Acid; Lanthionine; Lipase; Lysosome; Lysoxine; Malomoni-trile; Maltase; Melezitose; Mesobilirubineogen; Muscle Adenlyc Acid; Myoamine; p-Nitrophenylphosphate; Nucleoprotein; Orcinol; Pancreatin; Pangestin; Pantothenyl Alcohol; Penicillinase; Peroxidase; Phenazine; Phenolpyruvic Acid; Phloridzin; Phosphorylase; Pip- perin; Porphyridene; Protamines; Pyridoxal; Pyridoxamine; Pyrocatecholic Acid; Pyruvic Aldehyde; Ribonuclease; Saccharic Acid; Salmine; Serine Phosphoric Acid; Spermidine; Spermine; Thiocetatic Acid; Thioctyosine; Thyrione; Trigonellin; Triphenyltetrazolium Chloride; Tripyridyl; Tripsinogen; Tyrosinase; Tyrothricin; Urease; Uricase; Uridine; Vitellin; Xanthosine.

Ask us for others!

**DELTA CHEMICAL WORKS**

23 West 60th St. New York 23, N.Y.

Telephone PLaza 7-6317

**STATHAM Manometer and Control Unit**

Illustrated above is a complete system for the recording of rapid pressure fluctuations in the ranges encountered in physiological research. We invite you to contact us for details of the Statham un-bonded strain gage manometer.

**SCIENTIFIC INSTRUMENTS**

9328 Santa Monica Blvd., Beverly Hills, Calif.
FOR AMERICA'S LABORATORIES...

A New, Completely Direct-Reading Analytical Balance...

THE Gram-atic BALANCE

...weighs in one-third the time required by the usual balance.

Its control knobs are manipulated to select built-in weights. Corresponding figures appear on the direct reading scale.

Weights under 100 milligrams are indicated automatically.

The Gram-atic Balance weighs samples up to 200 grams and has constant sensitivity throughout this entire range.

For 115 and 230 volt 50-60 cycle A. C. $895.00 each.

Fast (20 second weighing) Eliminates all weight handling
Beam under constant load One-scale reading
Constant sensitivity Weighs below 100 milligrams automatically

Write for Folder No. 4G

Entire weight of sample is read on direct-reading indicator.

FISHER SCIENTIFIC CO.  EIMER AND AMEND

717 Forbes St., Pittsburgh (19), Pa.
2109 Locust St., St. Louis (3), Mo.
In Canada, Fisher Scientific Co., Ltd., 909 St. Jacques Street, Montreal, Quebec

Greenwich and Morton Streets, New York (14), New York
PHOTOVOLT
Radiation-Detection Densitometer Mod. 500-R

A photoelectric instrument for the exact measurement of density of X-ray film employed in personnel monitoring for protection against harmful radiation in nuclear, radioactive isotope, and X-ray work.

Write for Bulletin #270 to
PHOTOVOLT CORP.
95 Madison Ave. New York 16, N.Y.

MAGNIFIER
Folding, Doublet, 10x

HERE is an opportunity to procure a quality instrument at exceedingly low cost. Manufactured by expert optical technicians.

DOUBLE-CONVEX lenses, carefully mounted in aluminum housing, giving undistorted maximum field, very light in weight. Excellent magnifier for laboratory and field work.

No. 1874 MAGNIFIER, 10X .......... 4.00
10% discount in lots of 5 or more

NEW YORK SCIENTIFIC SUPPLY CO.
General Supplies for Chemistry and Biology
28 West 30th Street
New York 1, N.Y.
To be published this spring
in A SERIES OF CHEMISTRY TEXTS
edited by Linus Pauling

COLLEGE CHEMISTRY by Linus Pauling
An Introductory Textbook of General Chemistry California Institute of Technology

This is a text to answer the requests of those who want to use the "Pauling approach" to freshman chemistry, and have asked for a more slowly paced and less mathematical version of GENERAL CHEMISTRY. That is to say, COLLEGE CHEMISTRY is addressed to every serious college student with the normal preparation for college work.

The treatment is exact and purposeful. The conception and organization are original. There are many more elementary problems than in GENERAL CHEMISTRY. COLLEGE CHEMISTRY has approximately ninety new figures—by Roger Hayward, you may be sure—in addition to illustrations from Dr. Pauling’s other text.


COLLEGE CHEMISTRY IN THE LABORATORY by Lloyd E. Malm, University of Utah, and Harper W. Frantz, Pasadena City College

This manual is akin to A LABORATORY COURSE FOR PAULING'S GENERAL CHEMISTRY, and resembles it in method and general organization. But it is closely coordinated with Pauling’s COLLEGE CHEMISTRY and differs from the other Malm-Frantz in having more experiments, mainly on elementary aspects of chemistry.

The semimacro scale provides the size of sample which experience has shown is most efficient for each procedure.

With the aid of Roger Hayward's illustrations, even more abundant here than in our other manuals, the student rapidly achieves a mastery of procedure with a minimum of tutorial supervision.

Experiments new to these manuals are Substances in the Atmosphere, The Reduction of Metallic Oxides by Hydrogen and Other Reducing Agents, The Oxides of the Elements and the Periodic Table; The Chemistry of Nitrogen and Ammonia, Group Relationships in the Periodic Table, The Chemistry of the Compounds of Sulfur, The Chemistry of the Compounds of Nitrogen.

In addition, there are three optional experiments: Some Typical Organic Compounds, Biochemistry, Thermochemistry.
This modernized, improved B&L instrument gives you many new convenience features and advantages which no other Abbe-type refractometer can offer!

- Spare prism set available—no "down" time
- Internally mounted glass scale—high visibility and accuracy
- Metal housing—protects scale, moving parts
- Fixed position eyepieces—for comfort
- Built-in light source—plus reflector for external light source
- Low position wheel—for operating comfort
- B&L Durisite prism cement—reagent-resisting, easily cleaned, helps to avoid sample contamination
- Improved telescope and compensating system

WRITE for complete information and a demonstration to Bausch & Lomb Optical Co., 642-U St. Paul St., Rochester 2, N. Y.

Bausch & Lomb "Abbe-56" Refractometer