

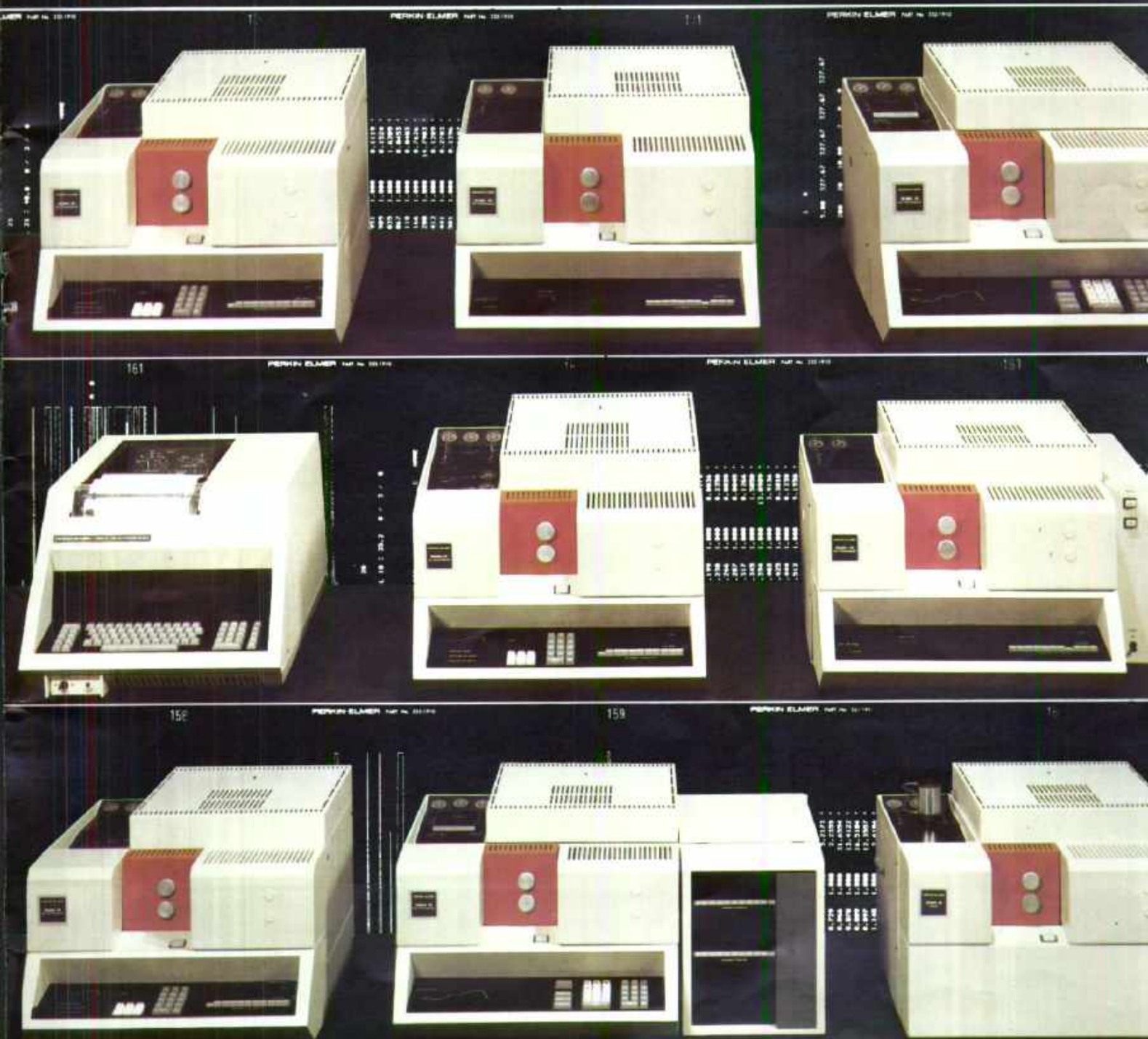
# Chemistry Yearbook

Vol. 43 No. 7

Produced by the publishers of 'Chemistry in New Zealand', official journal of the NZ Institute of Chemistry.

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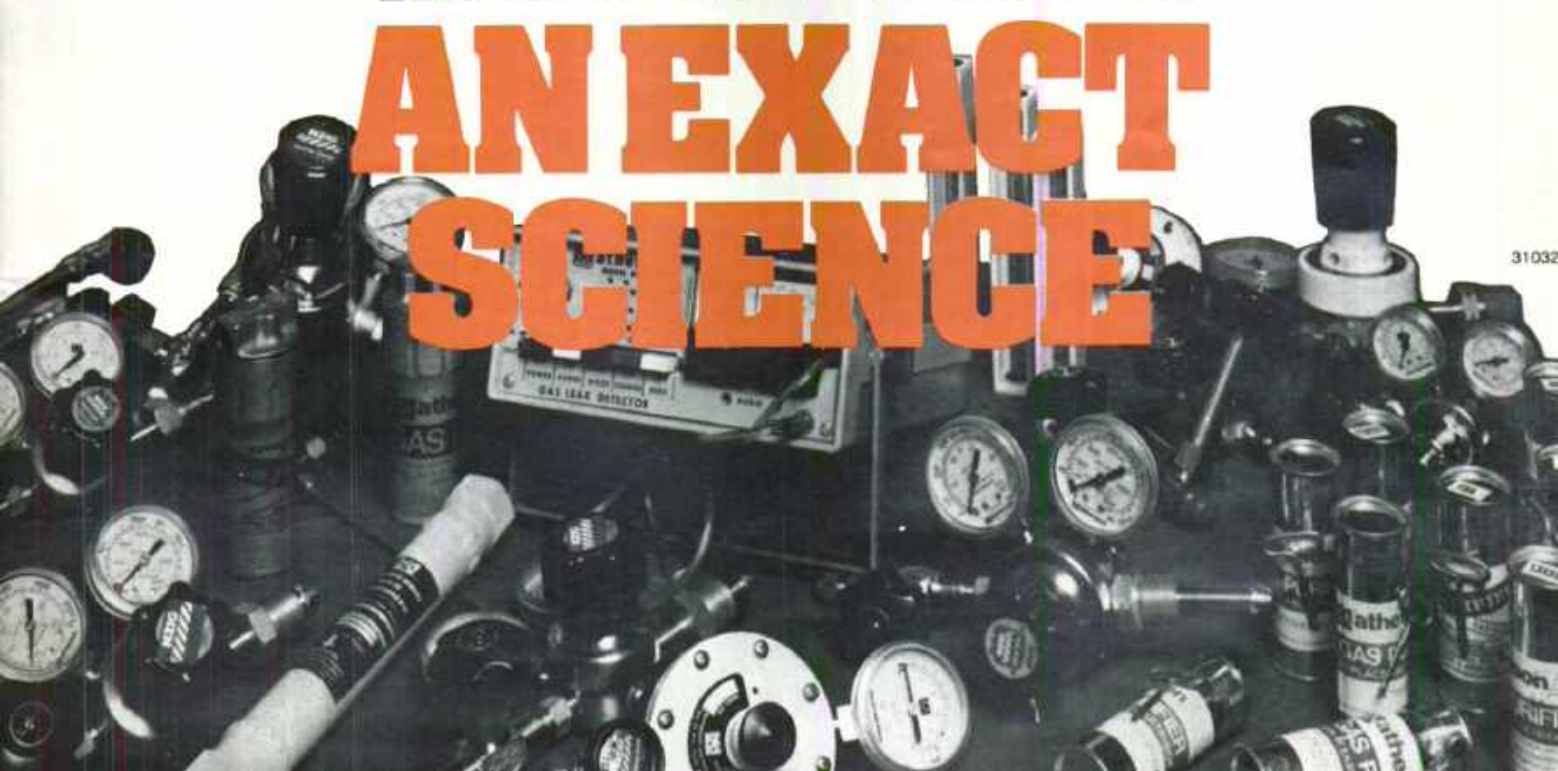
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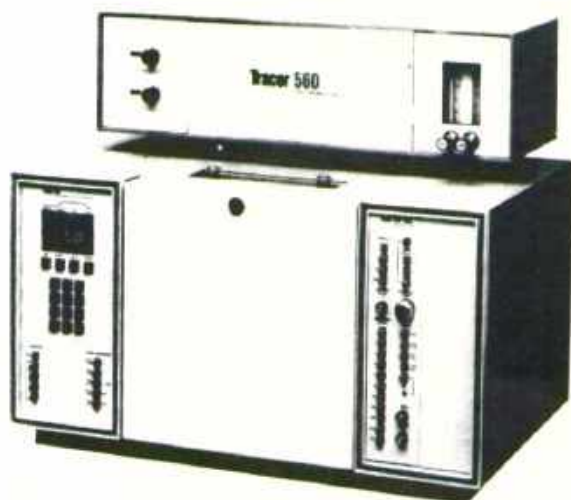
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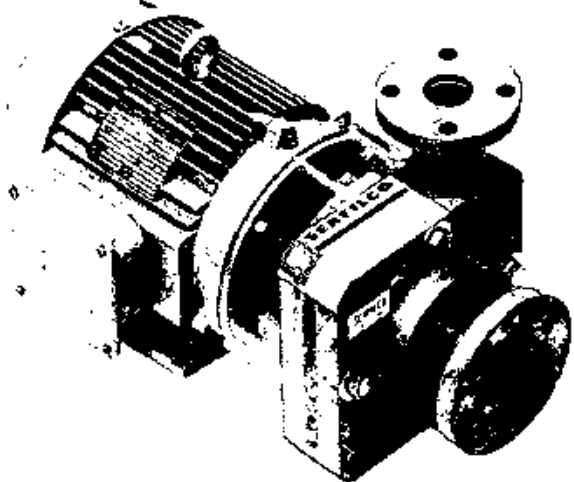
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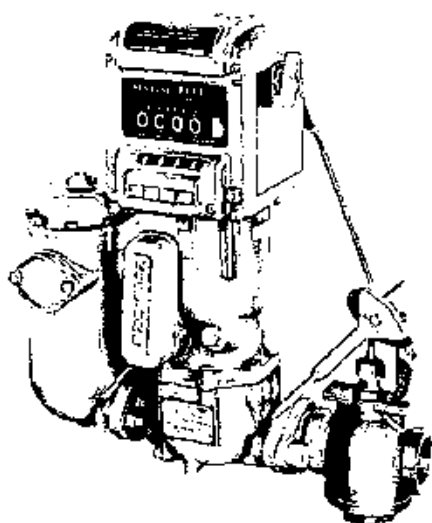
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 Crusade — S Biolab  
 Crystamet — Stauffer  
 Crystex — Stauffer  
 Culligan — L Tuck  
 Curafos — Stauffer  
 Curavis — Stauffer  
 Curaway — Stauffer  
 Curtofen — GAF  
 Cyanobrik® — Du Pont  
 Cyanogram® — Du Pont

Dalamar® — Du Pont  
 Damon/IEC — W Victor  
 Danfoss — Teltherm  
 Danochemo — B & Young  
 Data Lab. — W Franki  
 Darteck® — Du Pont  
 Daveo — ICI  
 DDS — MacEwans, Niro  
 Decalin® — Du Pont  
 Decon — S Wilton  
 Decis — Hoechst  
 Delrin® — Du Pont

Derminol — Hoechst  
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 Du Pont — N Cropper  
 Du Pont/Sorvall — W Victor  
 Dutton & Reinisch — Westminster  
 Duozine® — Du Pont  
 Dybin® — Du Pont

Eclipse — Data Gen.  
 Econo-Chrome® — Du Pont  
 Econo Columns — Bio Rad  
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 Edwards — S Wilton  
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 Elga — S Wilton  
 Elscint — W Victor  
 Elvace® — Du Pont  
 Elvacite® — Du Pont  
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 Elvamide® — Du Pont  
 Elvanol® — Du Pont  
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 Epolene — Swift  
 Eposyn — Titan  
 Eptam — Stauffer  
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 Escon — Steetley  
 Ethoxols — ICI  
 (Ethyl) Diethoxol — ICI  
 (Ethyl) Ethoxol — ICI  
 Evans Adlard — L Tuck  
 Everpure — L Tuck  
 Exelo — LS Pierce

Fabriglide — D Corning  
 Fab-X — Fabricell  
 Fedco — Croda  
 Fenafix — GAF  
 Fenopan — GAF  
 Fez — L Tuck  
 Finn Pipette — LS Pierce  
 Firmenich — Terry  
 Fluilan — Croda  
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 Fortran — M'proc. Dev.  
 Foss — W Victor  
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 Frisch — Terry  
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 Hitachi — M'proc. Dev.  
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**Hostyren — Panex**  
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 Huber — Chemiplas  
 Humboldt — LS Pierce  
 Humifen — GAF  
 Hunter — Advcd. Elect.  
 Hychol — Croda  
 Hydraphthal® — Du Pont  
 Hydro IS — ICI  
 Hydros S — ICI

IBM 3742 — M'proc. Dev.  
 ICN — S Biolab  
 Idrolan — Croda  
 IEC — Sci-Med.  
 Imidan — Stauffer  
 Imp. Eastman — A/D Pumps  
 Imprez 100 — ICI  
 Ino-Tech — ANAC  
 Integral Data System —  
 M'proc. Dev.  
 Ionac — Gamlen  
 Iscolan — Croda  
 Isocrete — Croda  
 Isotab — LS Pierce  
 Isopad — W Victor  
 Isopylate — Croda  
 Iupilon — Chemiplas  
 Ivo — K Garrett  
 Iwaki — MacEwans  
 IWKA Ag — TCP

Jade — M'proc. Dev.  
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 Jizer — Ind. Chem.  
 JM — E Tuck  
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 Jordan — Westminster  
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 Juniper, S & J — Hyde

K & K Labs — LS Pierce,  
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 Lauda — Zeiss  
 Leedex — M'proc. Dev.  
 Leonard — Rocklabs  
 Leopold — Gamlen  
 Levaix — Stauffer  
 Lindol — Stauffer  
 Lite — Stauffer  
 LK — MacEwans  
 LKB — W Victor  
 LKB-Wallac — W Victor  
 Lloyd, JJ — S Wilton  
 LND Inc. — ANAC  
 Loctite — K Garrett  
 Logitech — CED  
 Lohmann, Dr Paul — Terry  
 Lonza — Steetley  
 Lubrication Engineers —  
 K Garrett  
 Lucas — Lucas  
 Lucas Low Loss — Lucas  
 Lucas Pacesetter — Lucas  
 Lucite® — Du Pont  
 Ludox® — Du Pont  
 Lumatic — Stauffer  
 Luxol® — Du Pont  
 Lycal — Steetley

MacEwans — MacEwans  
 Mafco — Terry  
 Magnetic — Stauffer  
 Manning — Advcd. Elect.  
 Magnafloc — Chemiplas  
 Marine Colloids — Swift  
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 May & Baker — KMS, NDA  
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 Mercer — Mercer  
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 MPI — M'proc. Dev.  
 MSE — S Wilton  
 Murgolen — GAF  
 Musashino — Westminster  
 Myers Eng — TCP  
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Nalam® — Du Pont  
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Napthanal® — Du Pont  
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 Norchem — TCP  
 Nordia Lab — Nordia  
 Norgren — K Garrett  
 Norit — Swift  
 Nova — Data Gen.  
 Novamid — Chemiplas  
 Novatec — Chemiplas  
 Novo — B & Young  
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 Nuchar — Steetley  
 Nuclepore — E Tuck  
 Nucleus Inc. — ANAC  
 Nupro — Ak V & F  
 Nutralgum — Swift  
 Nymcel — Steetley

Ocea SAS — TCP  
 Oil-Dri — Ind. Chem.  
 Ohio Valley — LS Pierce  
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 OT — MacEwans  
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 Oxone® — Du Pont

Par — W Victor  
 Panacur — Hoechst  
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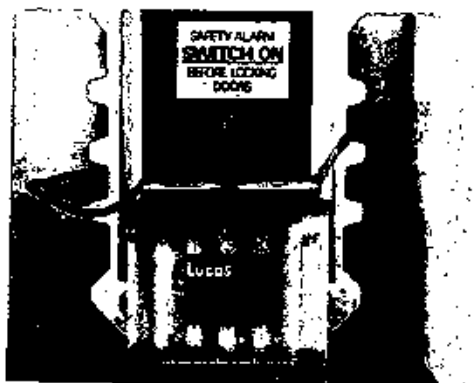
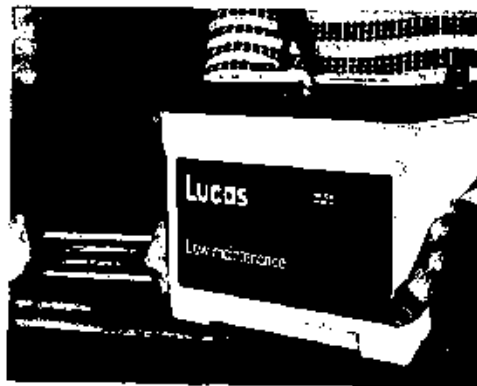
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# What's the big idea?



## four energy developments from Lucas!

You may think we're just a little ahead of ourselves, but we feel that there's nothing quite like a few new developments on the motoring scene to stir up a little excitement. That's why Lucas have stepped in with, not one, but four new developments to help cope with today's energy problems, and who doesn't have those. Three new batteries from Lucas. Just for starters, take our new Lucas Low-Maintenance Battery - it's called the Pacemaker 3, and it's so advanced that we've extended the free of charge replacement guarantee by 50%! Ask for it next time, it's better for you and your car. If you're into water, you'll already be using a Lucas totally dependable Marine battery in your boat.

What is new however, is that Lucas have come to grips with your handling problems. The next time you buy your boat's batteries you'll find it complete with a new polypropylene carry handle.

It may be that your problem isn't on the road or in the water - no problem, development number three is the new Lucas Stationary Battery for standby

power and fire or burglar alarms, specially developed to give a low rate of self discharge.

Charge your battery with solar panels, energy from the sun

Last on the list, for the time being anyway, is an item not concerned directly with motoring, but with a method of providing energy, becoming more and more popular and increasingly important every day.

If you run a car, marine or stationary battery you can now have them recharged effectively with the use of solar energy.

The Lucas Solar Energy System is self-contained, therefore ideally suited for unattended use at remote locations - mountain peaks, desert floors, even off shore locations.

With no fuel costs, pollution or noise, you'll be doing yourself a favour as well as the environment.

Lucas Solar Energy Systems - custom designed to power you through a minimum of 10 years continuous service, 24 hours a day, 365 days a year.

There's more to

# Lucas

LUCAS INDUSTRIES N.Z. LIMITED  
Private Bag, Auckland.

## BRAND NAMES

Papi — Uniroyal

Papi — Steetley  
 Parkelp — Stauffer  
 Pasilac — MacEwans, Niro  
 PCUK — Steetley  
 Peerless — Beck  
 Pelithone — Steetley  
 Pentabrie — ICI  
 Pentalan — Croda  
 Perfection — Stauffer  
 Perkin-Elmer — W Franki  
 Perone® — Du Pont  
 Petrowet® — Du Pont  
 Pfaudlex — Gamlen  
 Pharmacia — W Victor  
 Phosflex — Stauffer  
 Pierce — LS Pierce  
 Pierce Chemicals — LS Pierce  
 Pierce Inorganics — LS Pierce  
 Plasdone — GAF  
 Plasdone XL — GAF  
 Plasmamid — Croda  
 Polawax — Croda  
 Polyclair AT — GAF  
 Polysciences — LS Pierce  
 Ponolith® — Du Pont  
 Pontacyl® — Du Pont  
 Pontamine® — Du Pont  
 Poval — B & Young  
 Powers — Teltherm  
 Praestal — MacEwans  
 Prec. Packg. — TCP  
 Preflux — Steetley  
 Pressure-Lok — LS Pierce  
 Proctyl — Croda  
 Prochem — Prochem  
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 PVP — GAF  
 Pyrex — NDA  
 Pyron — Steetley  
 Pyrrolidones — GAF

Qualitron — CED  
 Qualux — W Victor  
 Questex — Stauffer  
 Quickfit — LS Pierce, S Biolab  
 Quilon® — Du Pont

Radiation Dynamics — ANAC  
 Radiometer — W Victor  
 R & L E'prises — S Biolab  
 Rannie — MacEwans  
 Ransomes — Terry  
 Raybo — Steetley  
 Raywell — McPhail  
 Recognition Systems — ANAC  
 Reclin — Steetley  
 Regent 12XX — Stauffer  
 REL — LS Pierce  
 Remazol — Hoechst  
 Renex — ICI  
 Rexolin — Steetley  
 Rheodyne — Advcd. Elect.  
 Rikadenki — W Franki  
 Rocklabs — Rocklabs  
 Romapo — Du Pont  
 Rona — Steetley  
 Rondo Ag — TCP  
 Ro-Neet — Stauffer  
 Roquette — Swift  
 Roscherwerke — MacEwans  
 Rotameier — Teltherm  
 Rudolph Brand — LS Pierce  
 Rylex® — Du Pont

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 Sawwa — W Franki  
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 S Biolab  
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 Solstat — KMS  
 Solvofen — GAF  
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 SRTI — Niro  
 Stacast — MacEwans  
 Stanton — KMS  
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 Stridsvik — ANAC  
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 Syl-Off — D Corning  
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 Technicon Lab Reagent —  
 Technicon  
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 Teflon® — Du Pont  
 Tefzel® — Du Pont  
 Telemechanics — W Victor  
 Teltherm — Teltherm  
 Tenac — Chemiplas  
 Tenox TBHQ — Swift  
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 Terics — ICI  
 Tetralin® — Du Pont  
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 Texanol — Swift  
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 Tillam — Stauffer  
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 W Victor 8, 10, 13, 15, 19, 21, 23, 25

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Christchurch: P.O. Box 1598, Ph. 783-734, Telex 4566.

Lower Hutt: P.O. Box 30-148, Ph. 646-048, Telex 9546.

## BRAND NAMES

Univar — Zytel

Univar — Searle  
 US Biochem. Corp. —  
 LS Pierce  
 US Gauge — A/D Pumps  
 UV Products — W Victor  
 Vacuum Generators —  
 Adved. Elect.  
 Van Air — L Tuck  
 Vapam — Stauffer  
 Varian — S Wilton  
 Varian Techtron — S Wilton  
 Vazo® — Du Pont  
 Vector Graphics —  
 M'proc. Dev  
 Vernam — Stauffer  
 Vet-X — Fabricell  
 VG Data Systems —  
 Adved. Elect.

VG Organic — Adved. Elect.  
 VG Scientific — Adved. Elect.  
 Vickers — W Franki  
 Victamide — Stauffer  
 Victamet — Stauffer  
 Victor Cream — Stauffer  
 Vicure — Stauffer  
 Vinnol — TCP  
 Vitrafos — Stauffer  
 Vitreosil — KMS  
 Volac — S Biolab  
 Volan® — Du Pont  
 Vollrath — Mercer  
 Volpo — Croda  
 Voss — W Victor  
 Vydux® — Du Pont  
 Vylor® — Du Pont  
 VWR S'fic. — LS Pierce

Wacker — B & Young  
 Wallace Oy — ANAC  
 Waring — W Victor  
 Watchung — Du Pont  
 Waters Assoc. — Waters

Wessanen — Terry  
 West — Teltherm  
 Westbrook — Terry  
 Westfalla — MacEwans  
 Weston — W Franki  
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 NDA, S Wilton  
 Wheaton — S Biolab  
 White Swan — Croda  
 Whitey — Ak V & F  
 Wiegand — MacEwans  
 Wielder — KMS  
 Wild/Leitz — KMS  
 Wiley — Wiley  
 Wilks — Fisher  
 Winnofil — ICI  
 Xatfin 15 — Croda

X-12 — Du Pont

Yeoman — Croda

Zalcon® — Du Pont  
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 S Biolab, W Victor  
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 Zircore® — Du Pont  
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 Zorbax — Du Pont, N Cropper  
 Zorelco — LS Pierce  
 Zytel® — Du Pont

## SERVICES

### ANALYSTS

L. Tuck

NZIG

### Chemical

Gamlen

Hyde

### Systems

CED

Digital

W. Franki

### Water

Gamlen

### CONSULTANTS

#### Chemical

Grayson

Circuit Diagrams

A/D Pumps

Ak. Valve & Fitting

#### Cleaning

Gamlen

#### Colourants

All. Colour

#### Equipment

Alfa Laval

#### Filtration

L. Tuck

#### Panel Fabrication

A/D Pumps

Ak. Valve & Fitting

#### Resins

CIBA

#### Sterilising

Mercer

### Systems

CED

Digital

W. Franki

### Water Treatment

Gamlen

Mercer

### DESIGNERS

Lab. Equipment

Sci-Med

### DEVELOPMENT CHEMISTS

Grayson

### EQUIPT. INSTALLATION

A/D Pumps

### GAS SUPPLIERS

NZIG

### GEOCHEMISTS

Rocklabs

### MINERAL EXPLORATION

Rocklabs

### SERVICERS

Water Deionisers

Prochem

### STORAGE

Freightways

### TECHNICAL ADVISORY

#### SERVICE

Hoechst

#### TRANSPORT

Freightways

## EXPORTERS

(Export agents shown in parentheses)

### Batteries

Lucas

### Battery Chargers

Lucas

### Chemicals

Bio Rad

Bryce (D.O. Brown)

Chemiplas

Du Pont

Gamlen (Amal. Customs)

KMS

L. Supp. Pierce

McPhail

NDA

Selby Wilton (Colebrooks)

York

### Colourants

All. Colour

### Computer Equipmt.

CED

### Confectionery Fats

Abels

### Emulsifiers

Abels

### Fillers, Whittings

Super Lime (AHI Agencies)

### Hydrostatic Test Rigs

Air Driven Pumps

### Laboratory Equipment

Gamlen

KMS

L. Supp. Pierce

L. Tuck

Mercer

McPhail

NDA

Rocklabs

### Sci-Med

Selby Wilton

Smith-Biolab (S-B Int'l)

### Laboratory Furniture

Mercer

Nordia

### Laboratory Glassware

NDA

### Laboratory Instruments

ANAC (ANAC Inc.,  
 California)

Bio Rad

Gilson

Hamilton (Hamilton Export)

N. Cropper

Selby Wilton

Teltherm

### Laboratory Reagents

BDH

### Protective Clothing

Fabricell

### Pumps, Valves

Air Driven Pumps

Ak. Valve & Fitting

Beck

### Raw Materials

Bryce

Chemiplas

Du Pont

Gamlen

York

### Resins

Titan

### Shortenings

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### Stainless Steel Equipmt.

NZ Fasteners

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# LIMESTONE

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- From large aggregates for the concrete block industry, "Superfine" agricultural lime, right down to the fine "Harvical" range of industrial fillers for the paint, plastic and rubber industries (including a minus 20 micron product).
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# PRODUCTS

## Acids — Chromatographs

### ACIDS

Allied Chem.  
ICI

### ADHESIVES, GLUES, HARDENERS

CIBA  
Croda

### ALCOHOLS, POLYVINYL

B & Young

### ANALYSERS

Advcd. Elect.  
Fisher  
Hyde  
N Cropper  
Philips  
Sci-Med  
S Wilton  
W Victor

### ASSAY EQUIPT.

Rocklabs

### BATTERY CHARGERS

Lucas

### BATTERIES

Lucas

### BIOCHEMICALS

BDH  
KMS  
LS Pierce  
S Biolab  
W Victor

### CALCULATORS

CED

### CENTRIFUGES

Sci-Med  
S Wilton

### CHEMICALS

Allied Chem.

### Allied Colour

BDH  
Bryce  
Chemiplas  
CRC  
Croda  
Du Pont  
GAF  
Gamlan  
Hoechst  
ICI  
KMS  
LS Pierce  
McPhail  
Mitsubishi  
NDA  
N Cropper  
Searle  
S Wilton  
S Biolab  
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TCP  
Terry  
Westminster  
York

### CHROMATOGRAPHS

#### GC/MS

N Cropper  
Gas/Liquid  
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# NEWS ON MICROPROCESSORS...

## VIDEO TERMINALS

**MICROTERM 1A:** 16x64 chs upper/lower case, automatic CR/LF on receiving more than 64 chs, 110-19200 baud.

Without monitor ..... **now only \$399**

**MICROTERM V:** 12 inch screen of 24x80 or 48x39 chs. A very intelligent terminal. Complete with RS232/20mA and printer port.

..... **\$1219**

**MICROTERM MIME-II:** Similar to above but also mimics with several industrial standard terminals. Complete with RS232/20 mA and printer port

..... **\$1219**

## 12" VIDEO MONITORS:

12 MHz band width ..... **\$299**

## DISC DRIVES:

We are NZ distributors for MPI 5 1/4 disc drives. These units provide five times faster access time and 23% greater storage capacity.

B51 single sided OEM unit ..... **\$390**

B52 double sided OEM unit ..... **\$490**

B51 unit in cabinet and with power supply for TRS 80 col ..... **\$550**

B52 unit in cabinet and with power supply for TRS 80 col ..... **\$650**

**Z80 EVALUATION KITS:** On board keyboard & display, K.C. standard cassette interface, 2K byte resident ZBUG monitor, 2708 EPROM PROGRAMMER on board, easy system expansion; \$100 compatible ..... **\$324**

## S-100 KITS

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Motherboards 9 slot kit .....	\$119	Y818 16 line x 64 ch. video kit .....	\$169
Z80 single board computer .....	\$312	VDB8024 24 x 80 ch. video kit .....	\$414
Z80 CPU Boards 2MHz .....	\$192	Dynabyte 24 lines x 80 ch. A.T. ....	\$438
Z80 CPU Boards 4MHz .....	\$203	Verilog floppy disc controller .....	\$206
8k Static Memory kits only .....	\$177	I/O serial, parallel & tape .....	\$202
16k Static Memory kit .....	\$399	Keyboards, 56 key, encoded .....	\$82
64k Dynamic Memory kits (less memory) .....	\$232	Tape Interface k.c. standard SV .....	\$45
		Real Time Clock .....	\$156
		Extender board & logic probe IV-2 .....	\$65

## SDS-100 MICROCOMPUTER SYSTEM:

34K memory, Megabyte disc on line, 22 MHz green phosphor video, keyboard and CP/M and compiler BASIC. All complete in an attractive cabinet. .... **\$8500**

**SD 25/50** computer modules providing 32/64k memory with optional video terminals, disc drives and printers. Price for minimum disc system with video terminal ..... **\$4600**

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**MEMORY CHIPS:** All popular sizes at popular prices!

## PRINTERS:

**Expander** — 80 col x 10 ch/sec upper case only, tractor or friction feed. Parallel port. Great value. .... **\$619**

**Seiko TX-80:** Dot Matrix 150cps with interface modules to all systems. Tractor feed upper and lower case. Special new release price ..... **\$999**

**TI Model 810:** 132 col x 150cps bidirectional printing. 6 part multi-copy capability ..... **\$2500**

## MISCELLANEOUS

S-100 connectors ..... **\$6.75**  
16 & 50 way ribbon cable and connectors IC sockets, heat sinks, wire wrap kits, voltage regulators (T03), etc. etc.

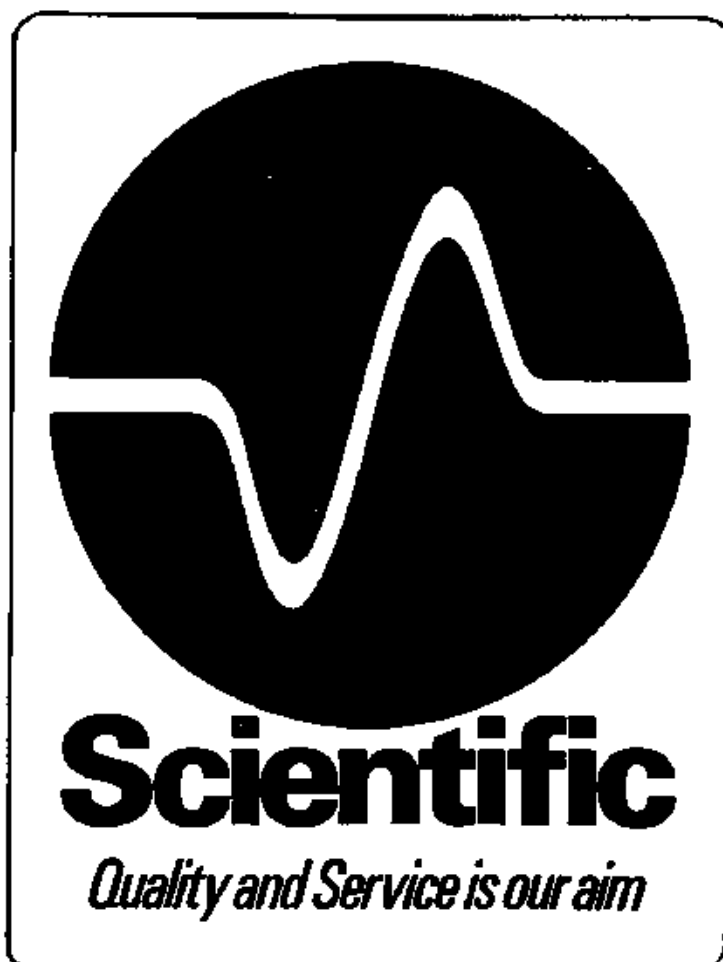
**TECHNICO 16 bit MICROCOMPUTER:** 34k memory, 500k Byte, floppy disc on line. New low price ..... **\$6660**

**SUPERSTARTER KIT:** Technico's single board computer based on the TMS 9900 16 bit processor. Its many features include on board EPROM programmer, resident monitor, 8 priorities of vectored interrupt, a resident input assembler (optional) and is fully buffered for system expansion ..... **\$452 plus tax**

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Ph: 857-988  
Telex: 3858

**CHRISTCHURCH**  
136 High St.  
P.O. Box 22-286  
Ph: 792-050  
Telex: 4762

**DUNEDIN**  
31 Stafford St.  
P.O. Box 319  
Ph: 774-746  
Telex: 5374

## PRODUCTS

### Chromatograph Equip — Laboratory Furniture

#### CHROMATOGRAPH EQUIPT.

N Cropper  
Sci-Med  
W Victor

#### CLEANERS

Contact  
CRC

#### Hand

CRC  
Ind. Chem.

#### Industrial

Gamlen  
Ind. Chem.

#### Solvent

CRC

#### CLEANSERS

Ind. Chem.

#### CLOTHING, PROTECTIVE

Fabri-Cell

#### COLOURANTS

Allied Colour

#### COMPUTER EQUIPT.

M'proc. Dev.

#### COMPUTER HARDWARE

Data Gen.

#### COMPUTER SOFTWARE

M'proc. Dev.

#### COMPUTERS, SYSTEMS

CED

Digital

M'proc. Dev.

W Franki

#### CULTURE MEDIA

BDH

#### DATA SYSTEMS/MS

Advoc. Elect.  
N Cropper

#### DETERGENTS

Ind. Chem.

#### DISPERSANTS

Gamlen

#### DYES

Allied Colour  
Du Pont  
Hoechst

#### DYESTUFFS

Hoechst

#### EMULSIFIERS

Abels  
Gamlen  
Steetley

#### ENGINEERING COMPONENTRY

K Garrett

#### ENZYMES

B & Young  
York

#### EVAPORATORS

Alfa Laval  
MacEwans  
Niro

#### FATS

#### Confectionery

Abels

#### Cooking

Croda

#### FILLERS, WHITINGS

Super Lime

#### FILTERS, SEPARATORS

Fram  
W Victor

#### FILTRATION EQUIPT.

Beck  
GAF  
L Tuck  
NDA  
S Wilton  
Swift

#### FLAVOUR ENHANCERS

B & Young

#### FLAVOURS

Swift  
Terry  
York

#### FLOW MEASURING

Advoc. Elect.

#### FLUIDS, PENETRATING

CRC

#### FOOD ACIDULANTS

B & Young

#### GAS MIXTURES

NZIG

#### GAS PANELS

A/D Pumps

#### GLOVES

Fabri-Cell

#### HEADWEAR

Fabri-Cell

#### HEAT EXCHANGERS

Alfa Laval  
MacEwans  
Niro

#### HUMECTANTS

B & Young

#### I-R SPECTROPHOTOMETER CELLS

Advoc. Elect

#### INJECTORS

Advoc. Elect

#### INTEGRATORS

Advoc. Elect

#### INSTALLATIONS, STORAGE

F'ways

#### INSTRUMENTS, ANALYTICAL

Fisher

#### ISOTOPIC ANALYSIS/MS

Advoc. Elect

#### LAB. EQUIPT.

Hyde  
KMS  
LS Pierce  
NDA  
N Cropper  
Niro  
Philips  
Rocklabs  
Sci-Med  
S Wilton  
S Biotab  
Teltherm  
Technicon  
Zeiss

#### LAB. FURNITURE

Mercer  
Nordia

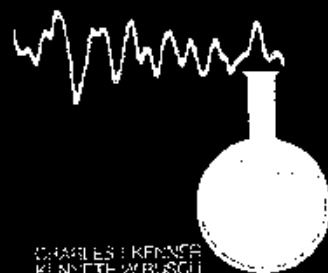
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## quantitative analysis



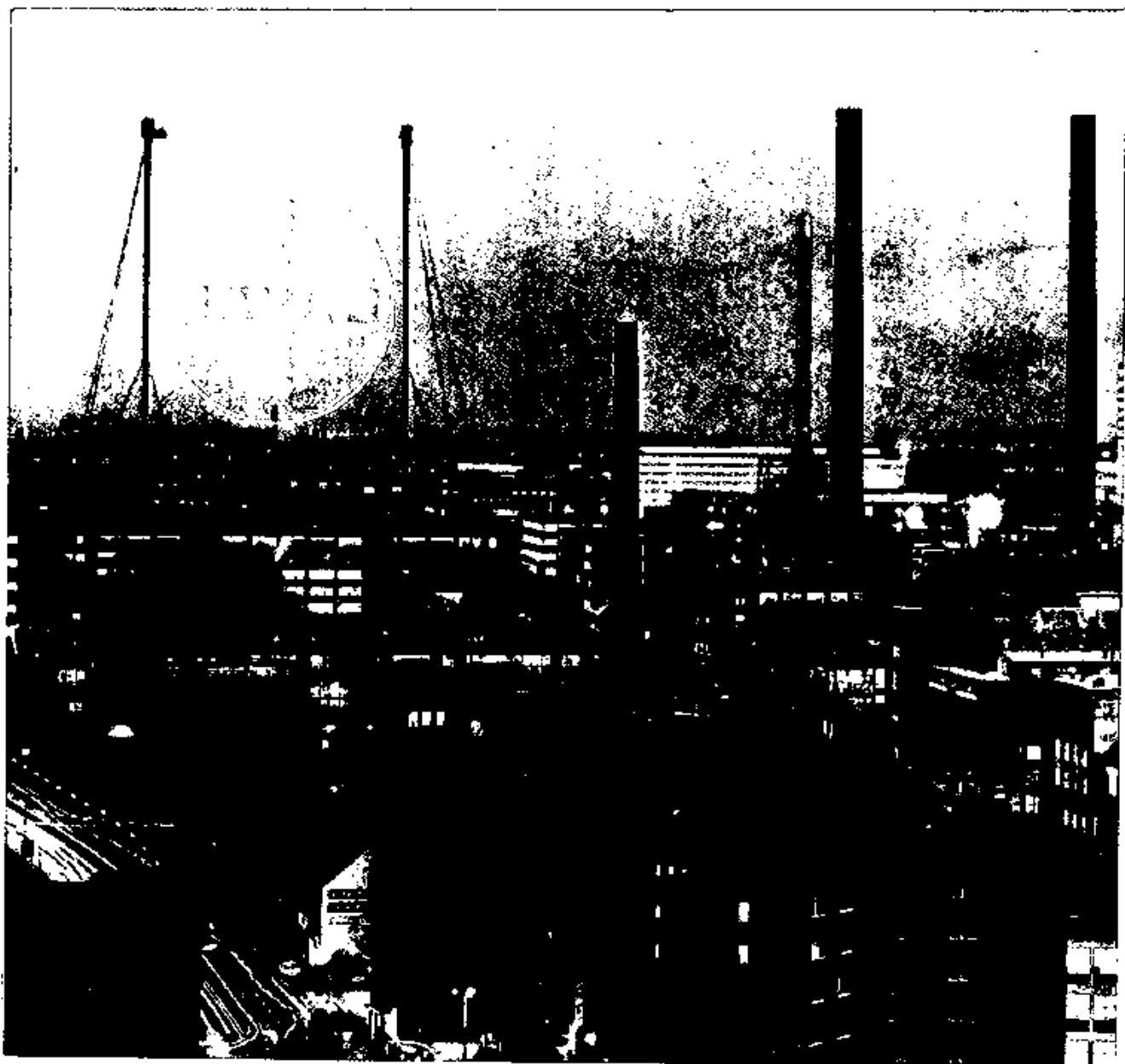
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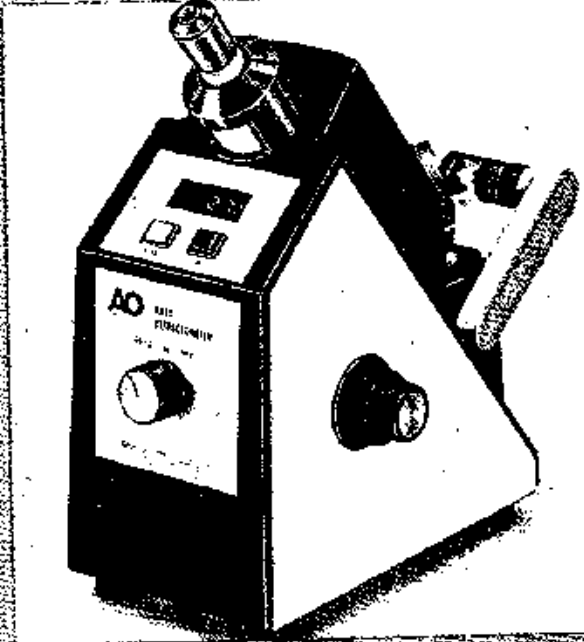
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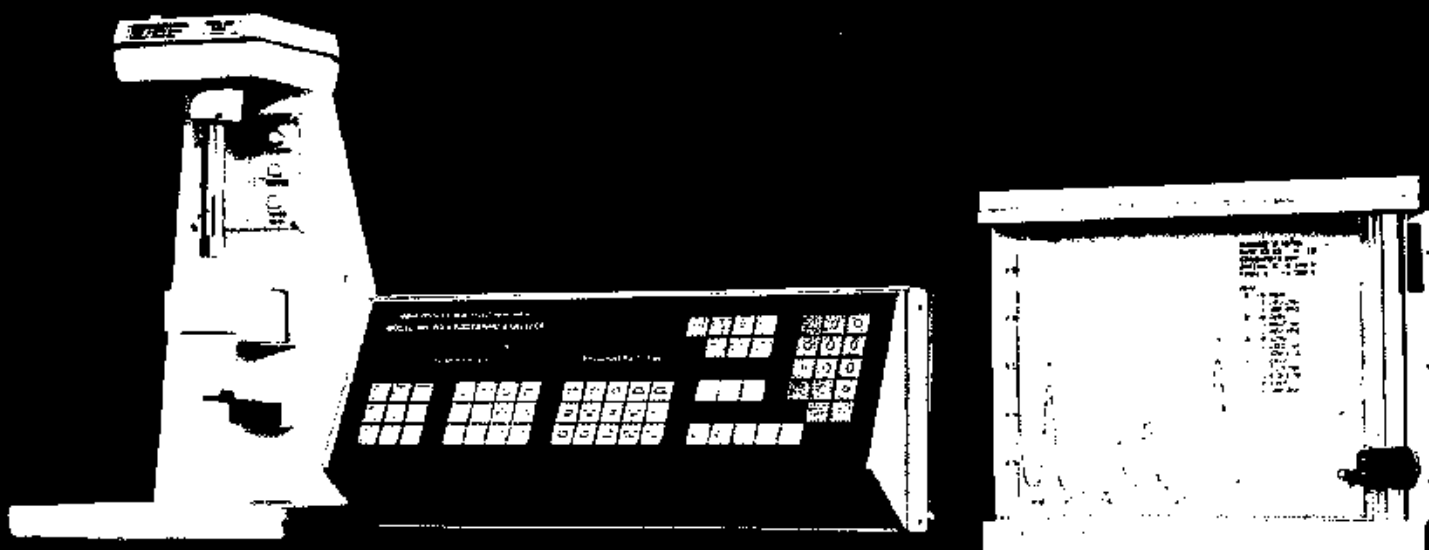
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*James L. Waters of Waters Associates, Massachusetts, USA, believes liquid chromatography has a bright future. He sees it as a tool that can make major contributions to preventive medicine and to society's health and well being; he sees the day when liquid chromatography will be as important to farmers as agricultural implements.*

*In an article entitled "Liquid Chromatography: Past, Present & Future", reprinted here in an abridged version, he says:*

## LC's Future Is Bright

We all know that a Russian, Michael Tswett, was the first to develop liquid chromatography. My education started immediately when I found out that in 1897 David T. Day in USA reported a liquid chromatography separation. He separated crude oil fractions using pulverised Fuller's earth. Day made the mistake of calling the separation technique "capillary diffusion" rather than adsorption chromatography. Partially as a result of misidentifying the fundamental phenomenon, he never received the credit for his early use of LC.

Tswett, in 1903, separated chlorophyll using calcium carbonate as a stationary phase and chloroform as a mobile phase. He identified his separation as an adsorption phenomenon.

The name "chromatography" is interesting. I always assumed that Tswett used glass columns to separate chlorophyll and, as a result, could see coloured bands moving down the column. I suspect that's what really happened. On the other hand, Tswett means "colour" in Russian. I wonder if Tswett didn't play a clever word game with us. By calling his technique, chromatography, he really was calling it "Tswettography". It could have happened that way.

For 25 years after Tswett's publications, LC remained dormant. In 1930 Kuhn and Lederer in Germany rediscovered the work of Tswett. They showed that LC was a powerful technique for separating compounds. During the 1930's interest grew slowly. TLC was invented by Taylor and Urey. Urey's Manhattan project separation of radioactive isotopes and their fission byproducts is a major chromatographic use of ion exchange resins.

In 1942, A. J. P. Martin and R. L. M. Synge invented partition chromatography. We now have Liquid/Liquid chromatography with a stationary liquid phase and a mobile liquid phase to add to liquid/solid (adsorption chromatography), ion exchange and thin layer chromatography. In 1952, Martin and Synge invented paper chromatography in which the stationary phases are paper. In 1952, working with A. T. James, Martin invented gas chromatography.

In the early 1940's, Tiselius developed electrophoresis in which an electrical voltage is used to move the sample through the column. Tiselius also developed gel filtration chromatography to separate molecules by size. Again, in 1952, Tiselius and his group developed gradient elution chromatography. Moore and Stein developed the amino acid analyser which uses an ion exchange column to separate amino acids in 1950.

Clearly, much work had been done by this time in liquid chromatography and the world has recognised many innovators in this field. Kuhn won the Nobel Prize in 1938, not for his LC work, but for other work that was somewhat related.

Tiselius won the Nobel Prize in 1948 for his work on electrophoresis and adsorption chromatography. Martin and Synge won the Nobel Prize in 1952 for their work in liquid chromatography. Moore and Stein won theirs in 1972 for their amino acid analyser.

About 1960 I developed a refractometer that was useful for monitoring LC columns. It was Waters Associates first LC product. In 1962, John C. Moore of Dow Chemical developed gel permeating chromatography (GPC); we obtained the license to this technology and entered a fast growth phase.

Between 1968 - 1970, we worked to develop higher pressure pumps, injectors, small particle technology so we could pack high plate per foot columns, highly sensitive UV detec-

tors and packings bonded with different functional groups. We also developed recycle LC and preparative as well as analytical capabilities.

This brings us up to the present. LC has come a long way but it still has a long way to go. I believe LC has a bright future; it is now a \$70 million a year business on a worldwide basis.

I think we've just scratched the surface of LC. There are still many applications that have not been tackled. LC equipment must be improved to become more automatic using automatic injectors and data processing so the LC users can increase their productivity. Increased reliability is vital. We have to make simpler products that are more reliable so more people can use them. We believe that the LC instrument of the future will be designed on an "intelligent communicating modular" basis.

I see LC equipment becoming more productive in the future. Liquid chromatographs will simultaneously analyse for many different compounds. For instance, if the LC has productivity, an inexpensive determination could be made for 100 - 1,000 compounds from a single injection. If data processing is efficient, comparison of compound concentration patterns could be related to abnormalities. A clinical analyser of this type could add greatly to the knowledge that a doctor has about the health of his patients. I see LC as a tool that can make major contributions to preventive medicine and to the health and the wellbeing of our society.

In the future, I see us developing specialised analysers. Examples are an on-line LC to measure polymer composition in a continuous plant or a specialised liquid chromatograph to aid radioactive metabolite studies. We should be able to take what is now a very laborious technique of fractionating the radioactive metabolites from urine or serum and convert it to a highly automated procedure providing the research worker with better data with much less labour so he can better understand metabolite mechanisms.

I believe we will open up new fields for liquid chromatography. We now have projects in polymers, pharmaceuticals, organic synthesis, foods and biologicals. An example of a new field is the measurement of sugar in corn. After all, if a farmer is selling his corn for its sugar content, he should be paid ac-

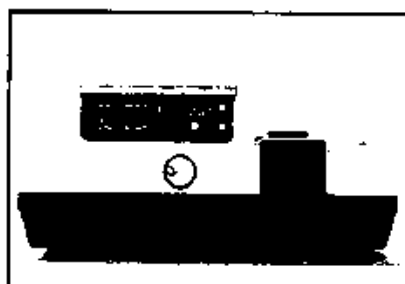
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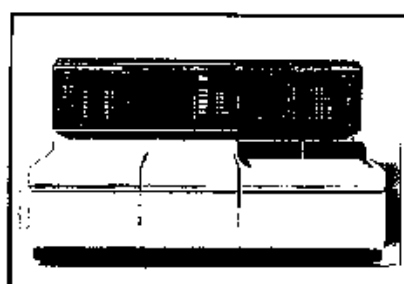
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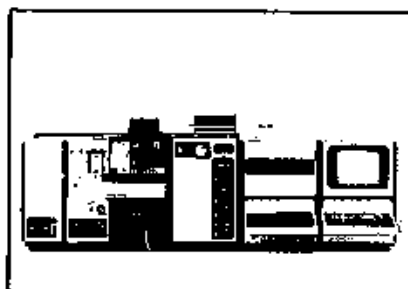
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In the automotive industry, for example, silicone fluids are used as the hydraulic

LC (Cont)

cordingly. Obviously, he will want to harvest different parts of his fields at times when the sugar content is maximised. I see the day when the farmers will have LC's as well as ploughs and combines.

from: **Biological/Biomedical Applications of Liquid Chromatography**, Volume 10, ed. Gerald L. Hawk.

Permission to reprint this article was kindly given by the publishers, Marcel Dekker Inc.

270 Madison Ave, New York.

medium in fan clutch and brake systems, as an additive for engine oils, coolants and detergent resisting polishes, and as a lubricant for rubber parts. Heat-cured silicone rubber is used for various seals, spark plug boots and wire insulation, coolant hose and shock absorbers. RTV silicone rubber sealants are used for formed-in-place gaskets in assembling engine components, and for windshield sealing.

The chemical processing industry uses silicones for release agents, defoamers, surfactants, textile and leather treatments, paint additives, paper coatings, powder treatments, water repellants, emulsifiers, wetting agents, ingredients for polishes and cosmetics and many other purposes.

Another major user of silicone materials is the electronic equipment industry. Silicone elastomers fill and encapsulate power supplies, amplifiers and entire circuit boards. RTV rubber encapsulants seal and insulate components and complete assemblies. Silicone varnishes impregnate windings and protect them from insulation breakdown. Rigid silicone plastics encapsulate power transistors and integrated circuits. Elastomeric coatings, heat-sink compounds, and damping fluids are used to protect and maintain efficiency of electronic equipment under severe environmental stresses.

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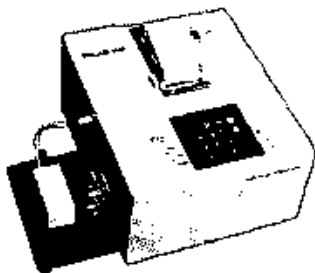
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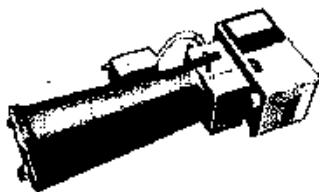
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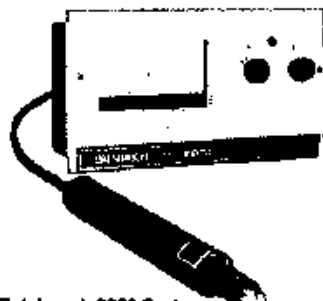


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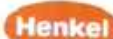
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### CHEMISTRY: KEY TO THE EARTH

*P.T. McTigue, Chief Editor.  
Melbourne University Press:  
Melbourne 1979.  
\$31.00*

In the Preface the Authors state 'a primary aim has been to present chemistry as it relates to human experience', and later, 'we deal with chemistry that is relevant to man's existence', and so with some misgivings I turned to the text. Would this book emphasize the environment and not the chemistry? Thankfully, the authors have not sacrificed good chemistry for the trendy 'relevant' chemistry of the environment, drugs, plastics or insecticides. These, and other similar topics, have a place in this book neatly interlaced with the main text. The emphasis is near perfect. Furthermore, the authors have not been afraid to look back, and interesting historical sections have been included where appropriate.

"Chemistry: Key to the Earth" has been divided into 6 units, the first 5 dealing with Physical and Structural Chemistry and Unit 6 (over half of the book) with Systematic chemistry under the heading 'Chemistry of the Biosphere'. Sections 1-5 include the structure of the atom, chemical formulae, equations, calculations, enthalpy, oxidation-reduction, rate, equilibrium, structure and bonding. Each section has a number of clear worked examples for the various types of calculation. Unfortunately, even though M is given as the symbol of Molar Mass in Appendix 4 throughout the text it is used as an abbreviation for concentration measured in mole per litre. In the electro-chemical section the authors admit that the use of anode and cathode in both electrochemical cells and electrolysis causes confusion. It would have been better to restrict their use to electrolysis and to use negative and positive electrodes when discussing cells. Considering the extent of this book the acid-base and solubility equilibria sections are surprisingly brief. This contrasts with the rest of the Equilibrium section which is discussed in detail. A table presenting equilibrium data for six chemical reactions (including acid-base solubility) is typical of the resource material in this book and maybe the sub-heading, "The Equilibrium 'Rule of Thumb': Le Chatelier's Principle", will discourage some students from saying 'the reaction moves to the left because of Le Chatelier's Principle'. Unit 5, 'Structure and Bonding of Materials' is very well done and includes a worthwhile section on 'Determination of the Structures of Chemical Compounds'. Each unit, including Unit 6, has a wide range of problems at the end of the Unit. There are over 500 problems in all with answers to the numerical problems at the end of the book. A feature of the systematic chemistry section is the excellent summary tables presented throughout the Unit. These range from rather complex 'oxidation state ladders' for individual elements, to tables

Yearbook 1979

which compare the properties of two related substances, for example, oxygen and sulphur or water and hydrogen sulphide.

A number of features of this book deserve comment. The large pages (21 x 27.5cm) are divided into two columns to make reading easier. Key points or small summaries are printed in red type. There are 17 excellent colour plates but a number of the black and white photographs are of poor quality. There are nine appendices which, in effect, provide a small data book. A very useful Glossary of scientific terms and a Bibliography of references for further reading are also included. There is a laboratory manual with teacher's guide written as companion volumes to the main text.

This book is aimed at Form 7 — Stage 1 level but because of the extent of treatment it may be difficult to justify its use as a pupil textbook at High School. Its use as a teacher and pupil reference book is strongly recommended. I will certainly value this book as an addition to my bookshelf.

D.T. Howarth

*D.T. Howarth,  
Christchurch Boys' High School.*

### ESSENTIAL IDEAS IN INORGANIC CHEMISTRY

*D.E. Wilson  
Hodder and Stoughton: London, 1978.  
170 pp. 2 pounds 75p sig. paperback.*

Dr Wilson states that the aim of his book, which is written for British 'A'-level students, is "to present inorganic chemistry in terms of the physical principles by which the properties of inorganic compounds are classified and predicted". A considerable knowledge of physical chemistry is assumed to have been obtained from physical chemistry textbooks. This assumed knowledge includes electronic structure and bonding, thermodynamic cycles, redox potentials and acid-base theory. It is a pity that this physical chemistry is not included in the text to allow the reader some continuity in terminology and diagrammatic representation between the two branches. It may be that the author intended the reader to purchase another of his books entitled "Essential Ideas in Physical Chemistry".

In order to pursue his aim, the author has produced an introductory chapter on the origin of the periodic table and some of the general trends in physical properties to be seen within the table. This is followed by nine chapters dealing with the elements grouped in a reasonably traditional manner, and is concluded by a chapter that suggests a series of simple test tube reactions that could be carried out in a school laboratory to illustrate some of the properties of the elements. The chapters on the descriptive chemistry of the elements are clearly and concisely written with many of the major facts collected together in schematic diagrams and tables. A number of industrial applications and processes are included as are some brief com-

ments on environmental aspects of inorganic chemistry. The book is well produced but contains the usual batch of typographical errors, e.g. Figs 5.8 and 5.9 have the captions reversed.

The information in the book seems to be somewhat too detailed for New Zealand secondary school use, but would probably be a useful addition to a school library for background reading. The lack of physical information in the text itself, particularly that relating to bonding, would seem to preclude the text from use at the first year level in Universities especially when one considers the wide range of well-integrated texts available at that level.

D.J. Spedding

*D.J. Spedding  
is Senior Lecturer in Chemistry  
at the University of Auckland.*

### FOOD ANALYSIS THEORY & PRACTICE: REVISED EDITION

*By Y. Pomeranz and C.E. Meloan.  
Avi Publishing Co., Westport, Conn., 1978.  
Pp 709, \$US21.00. Hardcover.*

Pomeranz is an American leader in food technology, particularly cereal science, and he joins with Meloan, Professor of Analytical Chemistry at Kansas State, to produce this book which is stated in the preface to be designed for use as a text by undergraduate students in food science and technology and a survey of modern analytical techniques for the worker in food analysis. It may be said at the outset that it succeeds in both respects. What it does not do is give precise details for carrying out the analyses; for these the worker should go to the AOAC methods, or Pearson's "Chemical Analysis of Foods", but it does complement these works as it gives the theory behind the methods used and the principles involved in the various instruments employed, and does it well. It could therefore be useful to analysts outside the food industry.

The book is divided into three sections. The first deals with the literature (a welcome inclusion), methods of sampling which have special difficulties with variable and perishable foods, and reporting results. The main part of the book, 476 pages, is devoted to a detailed description of equipment used in the various analytical processes applied to foods, including rheology, enzymatic and microbiological procedures. The final section deals with analyses used to monitor and investigate the major ingredients of foods and is largely a review.

A helpful aspect is the inclusion of numerous worked examples. Those who have the original edition, will be looking for changes; these appear to be confined to new sections on HPLC, affinity chromatography, immobilized enzymes, and near infra-red reflectance. It is a pity that the opportunity to include some new references in the other parts of the book was not taken.

The reviewer was puzzled by the statement on page 39 where interatomic distances within a molecule are discussed, "Those distances are measured in angstroms . . . if the distance from New York to Los Angeles is 1in, then an angstrom on the same scale would be about the width of a dime. A nm would be about the width of your hand and a

## Books (Con't)

um would be about the length of a football field" — which in US is 360ft. Can our readers work it out?

Finally it is good these days to see a hard-cover book so reasonably priced. It is value for money.

S.G. Brooker

S.B. Brooker  
is Scientific Editor of  
"Chemistry in New Zealand".

## REVIEWS IN INORGANIC CHEMISTRY. AN INTERNATIONAL JOURNAL FOR RAPID COMMUNICATION OF REVIEWS IN INORGANIC CHEMISTRY

By H.D.B. Jenkins and D.F.C. Morris  
(Editors).  
Freund Publishing House Ltd., Tel-Aviv.  
Publishing quarterly.

Another new journal — this time a medium for the "rapid communication of reviews in inorganic chemistry". Do we need yet another set of volumes on the library shelf? Do we need another avenue for the publication of reviews in the inorganic field? Do rapid reviews fulfil an obvious need? The writer was inclined to a firm negative as far as the first two questions were concerned even before opening the first copy of the new work and admits to having had doubts about the third. This view remains, with modifications, after perusal of volume I No. 1, the reviewer

believing that it is nowadays appropriate to consider the overall need for a new publication when assessing its particular merits.

The editors, in a preface, define the purposes of the journal as being especially to promote the rapid publication of "succinct authoritative articles" where "authors discuss their own work in the context of others in the field. The reviews will encompass all branches of inorganic chemistry — nuclear, biochemical, crystallography, kinetics, etc., etc., to provide an interplay of ideas. Longer surveys covering the broader literature will also be accepted". The editors go on to say that "as the recent trend towards 'synopses' of work becomes more established with a greater tendency towards deposition of scientific details on microfiche direct access to primary information is becoming more inconvenient. Accordingly the selective and critically written review article with its extensive bibliography must surely become more important". All this is accepted but only the intention to publish short articles in which authors discuss their own work seems in any way novel and it is conceded that this could be very useful. It is not, however, obvious that this is not already possible to some degree in the many avenues open to reviewers in inorganic chemistry.

It is not useful to report specifically on the four articles (one in French) in the first number other than to say that they seem to be of an appropriate standard. This could be expected from an editorial board containing more than a few familiar and respected names in inorganic chemistry. The technical production is also adequate. The reviewer suspects that the Journal is likely to be here to stay and that, with so many others, local libraries

are going to have to consider purchase or at least arrange access. This being so many readers will, from time to time, find articles of interest in the new publication.

J.M. Waters

J.M. Waters  
is Associate-Professor in Chemistry  
at the University of Auckland.

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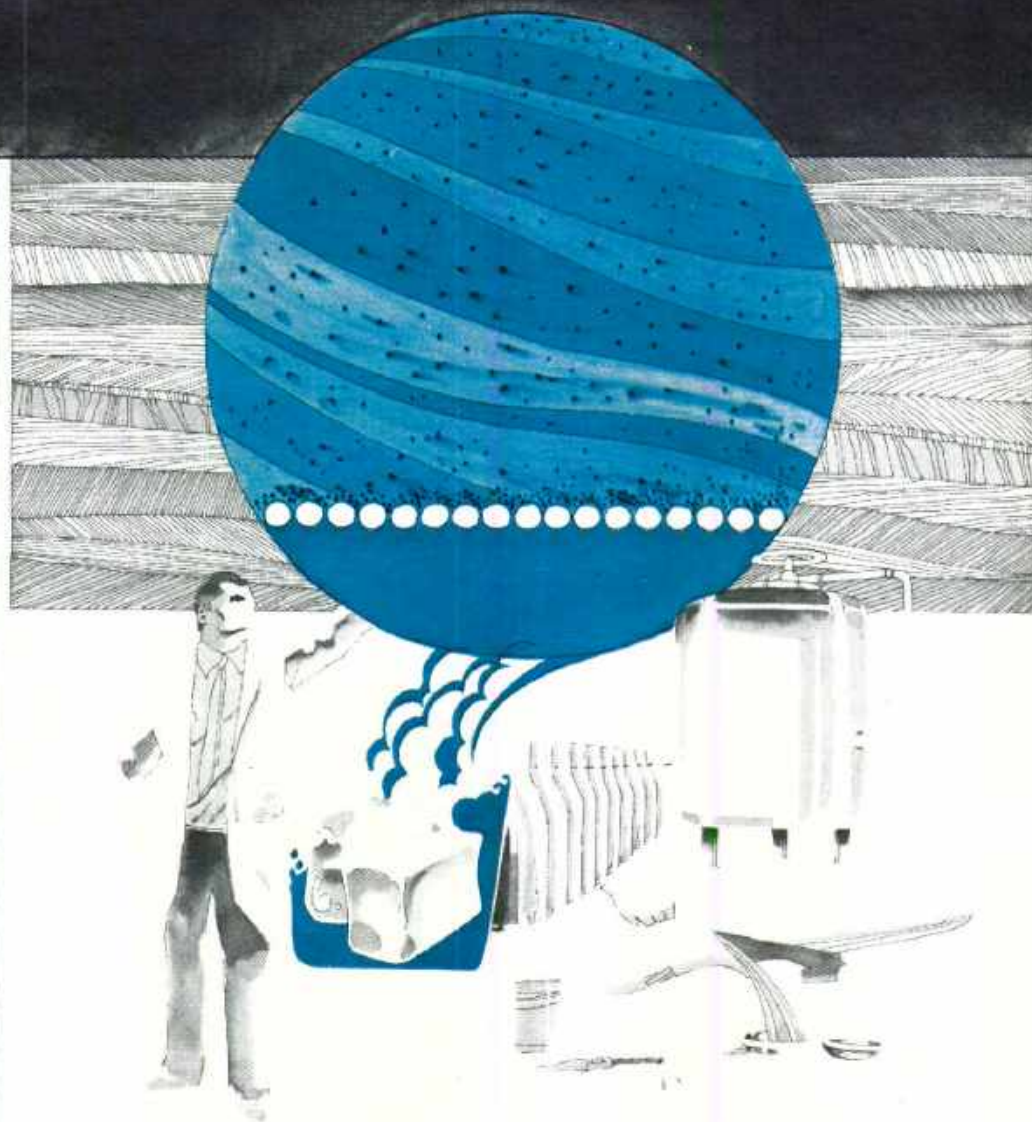
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## MOSSBAUER EFFECT DATA INDEX COVERING THE 1976 LITERATURE

By J.G. Stevens and V.E. Stevens (Editors)  
IFI/Plenum: New York 1978  
pp. 357, hardcover

This annual index consists of lists of references grouped according to nuclide (in the case of specific Mossbauer studies) or topic (analysis, theory, etc.). The references are also listed according to the  $\gamma$  source and absorber compounds, and are repeated in a master list, and in an alphabetical author index.

In considering the usefulness of this publication for chemists, it is worthwhile comparing it with the chapter on Mossbauer spectroscopy in the Chemical Society Specialist Periodical Report *Spectroscopic Properties of Inorganic and Organometallic Compounds*. A comparison of the entries for a few selected nuclides showed an almost complete overlap between the two publications as far as references of chemical interest are concerned. The Data Index contains in addition references to papers which deal mainly with topics in physics or metallurgy.

Thus for chemists with access to Specialist Periodical Reports, there would seem to be no compelling reason to purchase this volume, which seems to be aimed primarily at workers specialising in Mossbauer spectroscopy.

G.A. Bowmaker

G.A. Bowmaker is Senior Lecturer in Chemistry at the University of Auckland.

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## 1980 CONFERENCE CHECKLIST

Conferences to be held in various parts of the world during 1980 are listed below. Further information on any which interest readers may be obtained from Prof. P.S. Rutledge, Auckland University, Private Bag, Auckland. Where meeting dates are not known, they are listed only under the appropriate month.

### March:

- 3-7: Degradation Of Organic Coatings — Houston, USA.
- 3-7: Analytical Spectroscopy — Cleveland, Ohio, USA.
- 23-28: American Chemical Society — Spring Meeting, Houston, USA.
- 25-27: Chemical Reaction Engineering — Nice, France.
- 26-28: Phase Transitions In Molecular Solids — Exeter, UK.
- 26-28: Polymer Flow Properties — Loughborough, UK.

### April:

- 6-11: Liquefied Natural Gas — Kyoto, Japan.
- 7-11: Plasma Physics — Tokyo or Nagoya, Japan.
- 8-12: Biomaterials — Vienna, Austria.
- 9-11: Surface Coating & Surface Treatment — Durham, UK.
- 14-16: Chemical Engineering — Copenhagen, Denmark.
- 14-16: Chemical Engineering/Scandinavia — Copenhagen, Denmark.
- 15-17: UK Chemical Society Congress — Durham, UK.
- 16-18: Solid Separation — Dublin, Ireland.
- 21-25: Phosphorous Compounds — Boston, USA.

### May:

- 5-7: Atmospheric Pollution — Paris, France.
- 10-13: Non-Metals in Metal — Berlin, W. Germany.
- 12-16: ANZAAS — General Meeting — Adelaide, S. Australia.
- 27-30: Ion Exchange — Balaton Lake, Hungary.
- 28-30: Analysis of Pollutants — Dortmund, W. Germany.

### June:

- Medical Chemistry — Rensselaer, New York, USA.
- Polyvinyl Chloride — Cleveland, Ohio, USA.
- 2-6: Solute-Solvent Interactions — Florence, Italy.
- 2-6: Zeolites — Naples, Italy.
- 3-5: Particle Technology In Chemical Engineering — Amsterdam, Netherlands.
- 5-6: Textile Dyes — Baden-Baden, W. Germany.
- 15-20: Organic Synthesis — Madison, Wisconsin, USA.

9-13: Urethane Chemistry — Strasbourg, France.

22-26: Chemical Education — Rochester, New York, USA.

23-27: Water Pollution Research — Toronto, Canada.

23-28: Origin Of Life — Jerusalem, Israel.

June 27-July 1: Hydrogen Energy — Tokyo, Japan.

June 30-July 3: B-Lactam Antibiotics — Cambridge, UK.

June 30-July 4: Chromatography — Cannes, France.

June 30-July 4: Catalysis — Tokyo, Japan.

### July:

- 6-9: Drying — Montreal, Canada.
- 6-12: Thermal Analysis — Bayreuth, W. Germany.
- 7-11: Carbohydrate Chemistry — Sydney, Australia.
- 20-25: Photobiology — Strasbourg, France.
- 20-26: Analytical Chemistry — Lancaster, UK.
- 20-25: Fermentation — London, Ontario, Canada.
- 21-25: Germanium, Tin & Lead — Dortmund, W. Germany.
- July 28-Aug 1: Chemistry In African Development — Nairobi, Kenya.

### August:

- Ozone — Boulder, Colorado, USA.
- 17-22: Physical Organic Chemistry — Santa Cruz, California, USA.
- 18-22: Energy Conversion — Seattle, Washington, USA.
- 18-22: Transition Metals — Leeds, UK.
- 24-29: Biochemistry — Jerusalem, Israel.
- 24-29: 2nd Chemical Congress, N. American Continent — San Francisco, USA.
- 25-30: Nature, Aims & Methods of Microchemistry — Graz, Austria.

### September:

- 1-6: Reactivity Of Solids — Cracow, Poland.
- 2-5: Computers In Chemical Engineering — Heviz, Hungary.
- 2-5: Medicinal Chemistry — Madrid, Spain.
- 3-5: Microbial Adhesion To Surfaces — Reading, UK.
- 6-12: Solvent Extraction — Liege, Belgium.
- 7-12: Analytical Chem./Spectroscopy — Philadelphia, USA.
- 7-13: Macromolecules — Florence, Italy.
- 7-11: Coal As A Chemical Feedstock — Sheffield, UK.
- 8-10: Photoelectrochemistry — Oxford, UK.
- 8-12: Energy — Munich, W. Germany.
- 15-19: Industrial Safety — Basle, Switzerland.
- 15-19: Safety In Process Industries — Basle, Switzerland.
- 15-19: Fluorine Chemistry — Padua, Italy.
- 15-20: Polymer Networks — Karlovy Vary, Czechoslovakia.
- 16-18: Non-Aqueous Colloidal Dispersions — Edinburgh, UK.
- 17-21: Crystal Defects — Canterbury, UK.
- 22-25: Cosmetic Research — Venice, Italy.
- 22-26: Solid Surfaces — Cannes, France.
- 22-26: Polymerisation Of Heterocycles — Karlovy Vary, Czechoslovakia.
- Sept 29-Oct 3: Water Pollution Control — Atlantic City, New Jersey, USA.
- Sept 29-Oct 3: Modern Radiochemical Practice — York, UK.

### October:

- 13-15: Catalyst Deactivation — Antwerp, Belgium.

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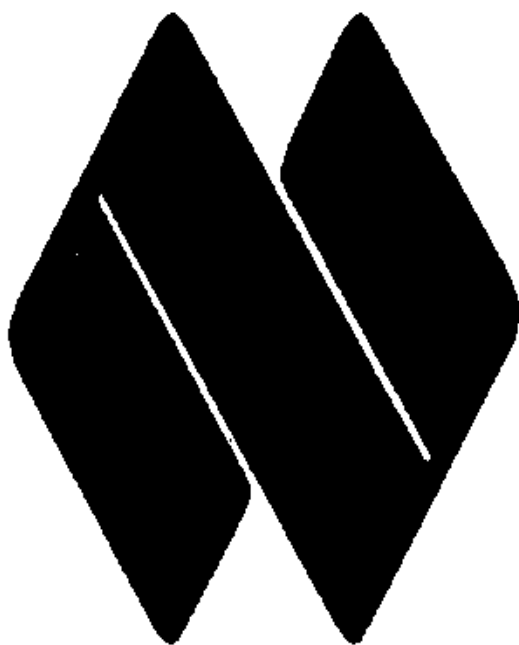
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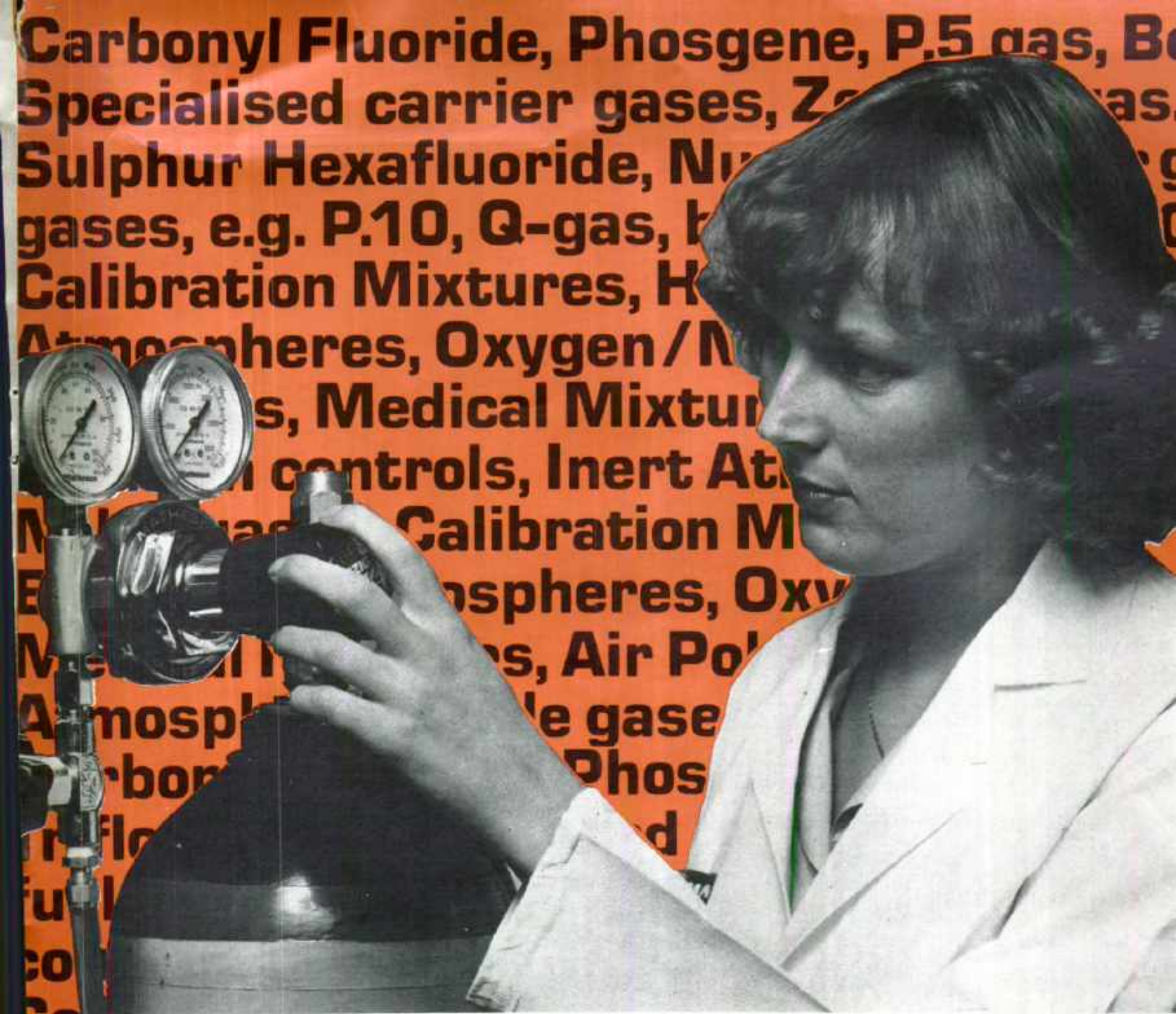
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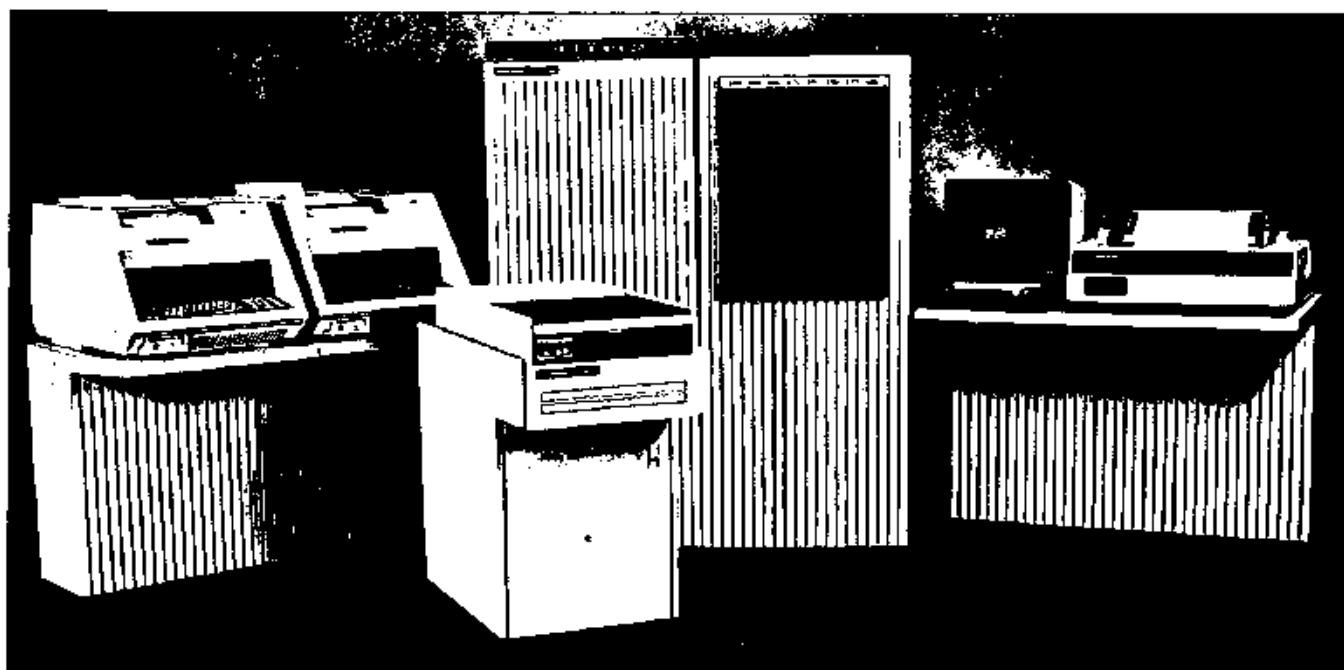
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# Chromatography Data Station Suits Current Needs, Expandable To Meet Future Requirements



SIGMA 10 Data Stations (left) shown with the Perkin-Elmer 3220 System.

Laboratories of the future will use more computing technology to manage the flow of samples and results. Anticipating this need, Perkin-Elmer has introduced its SIGMA 10 Chromatography Data Station to provide the necessary link to central computer systems through what is described as a unique, flexible protocol.

As total laboratory information systems grow, the SIGMA 10 can act as a network station — by pre-concentrating data before sending it through the RS-232C link to the host computer. Designers of computer systems believe that this network approach to computer systems is more efficient than burdening the central computer with the time-consuming task of real-time data acquisition.

The unit has a new, powerful bidirectional communications capability that uses an exclusive protocol. This allows it to function both as a remote stand-alone data station and, when used with a host computer such as the Perkin-Elmer 3220 System (illustrated), as an intelligent terminal in a distributed processing network. The interface, based on the RS-232 standard, permits bidirectional communication between the data station and the

3220 System by means of a flexible hand-shake protocol which can be tailored to the needs of the host computer.

It is housed in a single compact unit that contains a keyboard, lighted display panel, CPU, memory, printer/plotter, and I/O for chromatographic instruments. It will independently take the output from up to 4 chromatographs/detectors simultaneously and reduce that data to meaningful information, by using either standard pre-programmed calculation procedures or user-selected procedures written in SIGMA BASIC. The SIGMA 10 is also capable of interactive control of operating parameters for certain Perkin-Elmer gas and liquid chromatographs, thus providing an additional level of automation.

The unit communicates with the user in English, not coded numerics, and is immediately ready to run. The backlit display and ROM-residing question-and-answer dialog make complex entries simple for those procedures requiring more operator/machine interaction. This conversation guides the user during entry of all parameters necessary to analyse a sample, and it identifies this data with a unique

method number. These methods can be stored in memory or on magnetic tape cassette.

The built-in printer/plotter is capable of producing annotated chromatograms from any one of 4 active data channels, thus providing a real-time monitor of chromatograph performance. This in no way eliminates the possibility of using existing strip-chart recorders if desired. It prints reports from all 4 data channels and can file these reports if the station is in the dialog mode until the printer/plotter is again free.

For advanced laboratory data control, several SIGMA 10 Data Stations, each of which collects data from 4 locations simultaneously, can be incorporated into a central data management system along with other instrumentation. Thus, with its self-contained turnkey software, it can serve as part of a very powerful distributed laboratory information network that is customised and optimised to suit current needs and fully expandable to meet future requirements.

# High-Performance Liquid Filtration

Eric H. Crooke,  
Technical Sales Manager,  
Chemical Group, GAF (Australasia) Pty Ltd.

Quality is important — to the manufacturer who needs to achieve and maintain a high reputation for his product and equally for the consumer who associates performance with quality. The majority of manufacturers know that in today's technological environment the only real constraint in the degree of quality is that of cost. This is seen usually as either the degree of sophistication of equipment or the expertise of labour, or both.

We consumers, however, are a contrary lot. While we expect top quality, there is a predominant reluctance to pay the higher prices resulting from the necessarily attached costs incurred by the manufacturer. Thus producers, having long recognised the realities of commerce, usually present varying grades of the same product at appropriately varying prices.

Filtration is one of the most basic degrees of sophistication. Not all filtration results in higher quality. In many cases filtration does not improve quality, but ensures there will be no lowering of quality — this is insurance filtration. There is also the commonly encountered situation where a manufacturer employs filtration to remove some visible component from his end product so as to present a perceptible higher quality — even though this may not improve the product in application. The consumer associates quality with clarity — "free from all foreign or suspended matter".

A modern, effective option available in the world of filtration is a range produced and marketed internationally by GAF Corporation. This versatile, easy to operate bag filtration system in the last five years has gained wide industry support. The principle features of the system are:

- Simplicity — no moving parts.
- Speed of changeover of filter element — less down time.
- Wide range of quality micron rated filter bags from one to 850 micron in a wide variety of materials.
- Solids caught and retained in the bag for easy disposal — cannot re-enter the system during changeover as in the case of cartridges.
- Open or closed systems; pressure vessels available to operate at up to 300 psi.
- Smooth, continuous wetted surface — no corners to trap and build up solids.
- Interior of vessel contains only clean filtrate after bag removal thus reducing clean-up time.
- No tools required to operate or handle — no demarcation disputes.
- Vessel construction in a variety of materials — mild steel, stainless steel, etc.
- Variety of models available with flow rates from four to 4000 litres per minute.

- Ability to handle all viscosities — thixotropes are not a problem; is being used up to  $6 \times 10^3$  cps.
- GAF filter vessels are constructed in accordance with section VIII of the ASME code for pressure vessels.

The savings in time, labour and software replacement costs that can be achieved with the Gaflo pressure vessel system as well as quality filtration performance has been quickly recognised by industry and many companies have dispensed with their more traditional systems, replacing them with GAF bag systems. Typical products for which GAF filtration has been adapted are:

Abrasives, adhesives, aerosol products, chemicals, cleaning fluids, cutting fluids, detergents, dyestuffs, fabric coatings, lacquers, latices, liquid detergents, paints, paper coatings, petroleum products, pharmaceuticals, pigments, plasticizers, plastisols, plating solutions, polymer solutions, printing inks, process water, roller coatings, textile chemicals, waxes, vegetable oils and vinegar.

It is worthwhile to briefly look at the experience of some companies who have made the change to GAF filtration. Their problems and solutions to them could help you in that continual quest for improved quality for the lowest additional cost. These applications may be classified into four areas:



Flow pattern of unfiltered liquid through a pre-selected micron-rated GAF felt filter bag.

1. Removal of unwanted by-products or contaminants.
2. Insurance policy filtration.
3. Recovery of useful contaminants or by-products.
4. Use of calibrated bags as a grading mechanism.

## Unwanted By-products or Contaminants

This facet of manufacturing is where GAF filtration systems have been most widely adopted.

Filtration is quite necessary in the paint industry to remove particles which, if allowed to remain in the product, have a deleterious effect on the final counting. Particles which need removing vary widely across the broad spectrum of paint formulations and include things like polymer particles, hair, dry paint, pigment particles, paper, etc. GAF filter systems have caused a minor revolution in this industry. Most major paint manufacturers in Australia have adopted them and most major paint companies in Europe and the United States have done the same. One industry source was amazed to find that trials comparing the Gaflo unit with other traditional types of filtration resulted in a 70 per cent improvement in cost effectiveness.

The name of GAF is known throughout the world when it comes to vegetable oil filtration. They, along with most vegetable oil producers, have found improved throughput and large cost savings by replacing cartridge systems with GAF filter bags. Filtration is usually carried out at 10 microns.

As fast foods become more and more significant to our lifestyle, an increasing number of cooking oil facilities come into being. Whenever foods are cooked this way particles drop off and remain in the oil. They then burn and oxidise causing oil to discolour and eventually turn rancid, with the result that oil must be discarded and replaced. This is time consuming and costly. By using a Gaflo filtration system, and special high temperature Nomex filter bags, cooking oils may be continually filtered thus improving life. A large number of US food outlets have adopted this system.

Filtration in the ink industry is used mainly to filter out any dyes and pigments which may not have completely dissolved or dispersed, and any foreign particles which may have been picked up during the manufacturing process. In one instance with oil-based ink, where bags replace cartridges, downtime for changing the filter element was reduced from 30 minutes to two minutes. The Venus-Esterbrook Corporation in Lewisburg, Tennessee, were able to eliminate "dry writers" from their range of felt tip pens by choosing GAF filter bags for their water-based inks. This was not before various other systems had been tried and eliminated. They use five micron bags in a gravity-fed system for flow rates of five gallons per minute.

The applications which could be cited are only as endless as the imagination. There is insufficient space to continue here. Filtration of cooling and lubricating oils is one area where bag filtration has been very successful, also the polymer industry, pharmaceuticals and cosmetics.

## Insurance Policy Filtration

Once a manufacturer has a product of the desired quality for sale he wants to ensure that when it reaches the customer it is still of that quality. One method of ensuring that

## Limited-Use Garments Now For Industrial Applications

Two years after successfully launching a range of hospital garments made from the Du Pont fabric Tyvek, a Papatoetoe manufacturer, Fabri-Cell Developments Ltd., has introduced a similar range for industrial use.

The tough polyolefin fabric has good resistance to tears, abrasion and most chemicals. It has 4 major properties suiting it for use in protective garments.

It is:

- ★ lightweight — cotton fabrics are said to be up to 10 times heavier.
- ★ largely unaffected by most organic and inorganic materials, including acids, bases and salts.
- ★ a good particle barrier, through its dense sheet structure.
- ★ capable of holding in body particulate matter in cleanroom applications for product protection and holding out harmful particles, whether organic, inorganic, bacteriological or radioactive, for wearer protection.
- ★ anti-static and non-linting.

Fabri-Cell has identified several major end-use applications for its garments in NZ industry. These include especially dirty jobs (handling dyes, carbon black or resins); where low cost and/or durability offer savings — one-use visitor garments, headwear, for instance; where protective garments for products are needed, as in the pharmaceutical and electronic industries; where protective garments for wearers are needed, as in working with asbestos, pesticides, chemical compounding and fibreglass; and where low linting and protection for workers' personal clothing is required, such as in paint spray booths and fibreglass coating.

Comparison tests between Tyvek and other commonly used conventional fabrics for hold-out and chemical resistance show that the former provides much better protection against particle penetration and significantly higher hold-out against liquid (water).

This partial listing of chemicals having no significant effect on the material is indicative of its qualities:

<b>ACIDS</b>	Sodium chlorite
Sulphuric acid	Sodium hypochlorite
Hydrochloric acid	Sodium sulphite
Nitric acid	
Phosphoric acid	<b>SALT SOLUTIONS</b>
Hydrofluoric acid	Aluminium chloride
Chromic acid	Aluminium sulphate
Hydrobromic acid	Ammonium chloride
Sulphuric acid	Ammonium nitrate
	Ammonium sulphate
<b>BASES</b>	Ammonium thiocyanate
Ammonium hydroxide	Cadmium chloride
Sodium hydroxide	Calcium chloride
Sodium carbonate	Calcium thioyanate
Sodium orthosilicate	Chromic sulphate
	Cobaltous sulphate
<b>ORGANIC CHEMICALS</b>	Copper chloride
Acetamide	Copper sulphate
Acetic acid	Ferric ammonium sulphate
Acetone	Ferric chloride
Aniline	Ferric citrate
Benzene	Ferric nitrate
Carbon tetrachloride	Ferric oxalate
Chloroform	Ferric sulphate
Ether	Ferric potassium sulphate
Ethyl alcohol	Ferrous sulphate
Ethylene glycol	Magnesium chloride
Formaldehyde	Manganese chloride
Formic acid	Mercuro chloride
Freon 113 refrigerant	Nickel chloride
Gasoline (leaded)	Potassium chloride
Glycerol	Potassium thiocyanate
Kerosene	Silver nitrate
Methyl alcohol	Sodium bisulphate
Methylene chloride	Sodium bromide
Mineral oil	Sodium chloride
Naphthalene	Sodium fluoride
Phenol	Sodium nitrate
Trichloroethylene	Sodium nitrite
Trifluoroacetic acid	Sodium sulphate
Turpentine	Sodium thiocyanate
	Stannic chloride
<b>OXIDISING AND REDUCING AGENTS</b>	Stannous bromide
Calcium hypochlorite	Stannous chloride
Chlorine water	Zinc chloride
Hydrogen peroxide	

Resulting from continuing research and development work, an extended range of garments made from coated and lined Tyvek will be released in 1980. These will have specialised end-use applications in many of industry's problem clothing areas.

Fabri-Cell Developments Ltd.,  
Box 23-707 Papatoetoe.

## XY/t RECORDERS

The PL1500 and PL2500 from J.J. Lloyd Instruments Ltd. are new, full-function A3 size XY/t recorders fitted with 1 or 2 pens respectively on the Y axis. The manufacturers claim that they have been able to include an integral chart drive at no additional cost by reducing the number of different models produced and avoiding more costly modular construction. This rationalisation has been achieved by including in the standard specification and price items commonly offered as optional features.

The new recorders accept A3 size graph sheets but are primarily designed for use with roll chart paper for which an integral precision crystal-controlled chart drive is included. X and Y channels are identical and provide 18 calibrated sensitivities from 25  $\mu\text{V}/\text{mm}$  to 500  $\text{mV}/\text{mm}$  and a variable control provides continuous overlap between ranges. A check zero button is provided. Inputs are fully floating with a constant high impedance greater than 1 Mohm at all sensitivity settings. The high accuracy (0.2%) and linearity (0.1%) combine with the fast writing speed of 1000  $\text{mm}/\text{s}$  to ensure faithful recordings for a wide range of applications.

The integral time base uses a ramp derived from a crystal controlled oscillator to provide 18 accurate sweep speeds from 2  $\text{mm}/\text{min}$  to 400  $\text{mm}/\text{s}$  with manual or remote 'run/reset' capabilities.

For longer records, the chart drive system gives 18 paper speeds from 0.1  $\text{mm}/\text{s}$  to 20  $\text{mm}/\text{s}$  with an accuracy better than 0.01% and so allows for operation as a true Y/t recorder. In the XY mode this chart drive also enables the paper to be advanced automatically by a full or half frame triggered by a push button or external signal. This feature is invaluable for repetitive test applications.

Two-pen models are provided with full pen overlap and only 2 mm trace separation. An optional integrator may be switched onto the second pen to enable it to record the time integral of the other channel.

Both instruments use disposable fibre-tip pens and incorporate electric pen lift, remote start/stop facilities and provision to control the speed of the chart drive from an external source. The instruments are suitable for horizontal or vertical operation.

Selby-Wilton Scientific Ltd.,  
Box 31-044 Lower Hutt.

## METAL CLEANING PROCESSES

The effective cleaning of metal parts without damage to the metal can be assured by accurate control of the effective alkali concentration in alkaline and caustic metal cleaning solutions. Detail of such a measurement and control system is given in a new application report recently published by the Balsbaugh Electrochemical Centre of Foxboro Analytical.

Yearbook 1979

The report points out the importance of continuous control of the concentration of the bath to avoid damaged and poorly cleaned products and shows how accurate conductivity measurements can be secured despite the fouling which generally affects such attempts. It points out how other additives can work on the process and suggests alternative steps which may be taken to determine the actual conductivity ranges and set points necessary to secure an accurate measurement of the solution.

Descriptive copy and a schematic illustrate how the compact Balsbaugh CCI Chemical Concentration Controller, or similar Balsbaugh 1210 Series Electrodeless Conductivity System, generally permits accurate control of the erratic concentration of the caustic solution used in many primary metal and metal working industries.

W. Arthur Fisher Ltd.,  
Box 12-747 Auckland.

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# “It's in the bag.”



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polymer solutions, roller coatings, etc. We also manufacture and stock a comprehensive range of filter cartridges.



### **GAF NZ Ltd.**

Auckland: 243 Great North Road,  
Grey Lynn, P.O. Box 78-037  
Telephone: 767-603.  
Wellington: 9-11 Jesse Street  
Telephone: 847-972

contamination by foreign bodies does not occur is a final filter; but herein lies a problem. An additional cost will be incurred to guarantee an existing quality. The producer therefore desires the most cost effective alternative and the Gaflo system stands out.

At least the Daimler-Benz company thinks so because they use the GAF system as a final filter for their car enamel which has already been filtered by the manufacturer. Allied Chemicals (US) use a stainless steel GAF filter for loading 93 percent sulphuric acid to tank cars. One five micron polypropylene bag lasts for 500 gallons, at an average flow rate of 30-35 igpm. An unusual but critical application of the small in-line RBX filter is for safety showers in several of Britain's large industrial complexes. Safety showers are installed for emergency use — they usually work, but it is always possible that rust particles could cause a blockage at a crucial time. A small trap filter in the line obviates the problem.

**Recovery of Useful Contaminants or By-products**

This is an area where many other filter systems fall by the wayside. But it is a made-to-measure situation for the Gaflo unit. The filter bag is a strong, convenient receptacle for valuable by-products. Inolex Corporation, Illinois, US, manufacture animal derived pharmaceuticals. All inputs to the processes are filtered to ensure utmost product purity. Inolex were using carbon steel filters and ceramic cartridges, and in April 1974 they changed over to stainless steel filters incorporating polypropylene bags. Unlike throwaway cartridges the bags can be washed and re-used several times. The company is also able to use the bags to recover small quantities of produce from the process effluents saving between \$50 and \$100 per day, or an average \$20,000 per annum.

Degussa in Germany are using this method to recover silver powder from waste water and a US firm is recovering gold from polishing lint and oil in the jewellery industry. In both cases the bag is burned and the metal recovered as a melted mass. Also in Germany, red pepper shell extract is filtered to cover a naturally occurring dye-stuff.

**Calibrated Bags as a Grading Mechanism**

This is a somewhat specialised area and serves to emphasise the versatility of this simple filtration system.

In the US, marine biologists are pumping seawater through filter bags to capture zooplankton. By altering the micron rating of the bag, different organisms are trapped. In a similar vein, research workers in Australia are able to obtain quite specific strains of bacteria by filtering a solution of mixed micro-organisms through a graded system of bags. This particular application relates to diseases in chickens.

The foregoing case notes highlight just a few areas where manufacturers have employed Gaflo filtration as a means of quality improvement. It is clear that this system offers enormous potential for the solution of any filtration problem.

GAF NZ Ltd.,  
Box 78-037, Auckland.

**Du Pont Launches NZ Operation**

Du Pont (NZ) Ltd, a wholly-owned subsidiary of the US-based E.I. du Pont de Nemours & Co. Inc., commenced operations with the opening of its Auckland offices in November.

The new company was established earlier in 1979 with the consent of the Overseas Investment Commission. Du Pont (NZ) will undertake the distribution of Du Pont products currently handled by Neill, Cropper & Co. Ltd. The company also plans to build and operate a plant for the manufacture of "Tovex" water gel explosives for commercial use in mining, construction and quarrying, after appropriate licences and approvals have been received.

Managing director of the new company is Peter A. Scott, formerly general manager of Du Pont's operations in Thailand.

Neill, Cropper, a subsidiary of Wattie Industries Ltd., has sold Du Pont products in NZ for the past 25 years. The company will maintain a close relationship with Du Pont, and J.P. Dunlop, managing director, Wattie Trading Division, has agreed to serve on the directorate of Du Pont (NZ) Ltd.

Du Pont had worldwide sales in 1978 of more than US\$10 billion. The company has 27 principal subsidiaries and affiliated companies in 25 countries. Its products include agricultural chemicals, synthetic rubber, x-ray and printing films and equipment, plastic products, films and resins, pigments, explosives, and textile fibres.

Du Pont (NZ) Ltd.,  
Box 977, Auckland.

**RESISTIVITY MONITORING INSTRUMENTS**

A new and wider line of realistically-priced monitoring instruments for measuring resistivity of pure and ultra-pure water was recently introduced by the Balsbaugh Centre of Foxboro Analytical.

Designated as Style B, 920 Series, the new line features a highly accurate monitor with dual-thermistor compensation to cover all ranges and a built-in manual calibration check. The easy-to-read meter shows readout of resistivity in 3 ranges with accuracy within 2% full scale. The solid state construction is designed with 2 circuit boards connected by a flexible cable permitting monitor opening during operation for easy, unobstructed maintenance. Front-panel LED indicators show resistivity measurement above or below set point. Output of 0-10 volts drives chart recorder or similar device, and optional outputs are available for driving remote devices.

The wide variety of industrial-designed resistivity sensors features cell constants of 0.01. All cells are specially constructed of titanium, and are insulated and guarded to ensure highest accuracy.

Dual thermistors are incorporated in all twist-lock and conventional cell designs and a wide selection of mounting options, for every industrial use, is available.

W. Arthur Fisher Ltd.,  
Box 12-747 Auckland.

**SPECTROPHOTOMETRIC DETECTOR**

Said to offer advantages over UV detectors currently in use for liquid chromatography, the new Perkin-Elmer LC-75 is claimed to be more powerful than earlier detectors, smaller (to occupy less bench space) and modular.

It features a single power switch for both source and electronics, a single pushbutton range switch, fine and coarse zero controls and a variable wavelength selector knob.

Dependable wavelength resettability to spectroscopic standards, accurate reproduction of literature methods and no time degradation in performance is claimed for the unit. Trace analysis is said to be good even with small samples and quantitative capability is high.

Warburton Franki Ltd.,  
Box 8620 Auckland.

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# WORKING IN-LINE.

**C**ase History: With the Kind Permission & Courtesy of McGaw Ethicals Ltd - Ethical Manufacturers.

The Klean-Flow III<sup>®</sup> "Automatic" Butterfly valve being used to control the flow of bulk intravenous solution from mixing tanks, through 0.45 micron membrane filters and into a break tank.

The filtered product is fed

through a mixing machine into a final container, sealed and terminally steam sterilized.

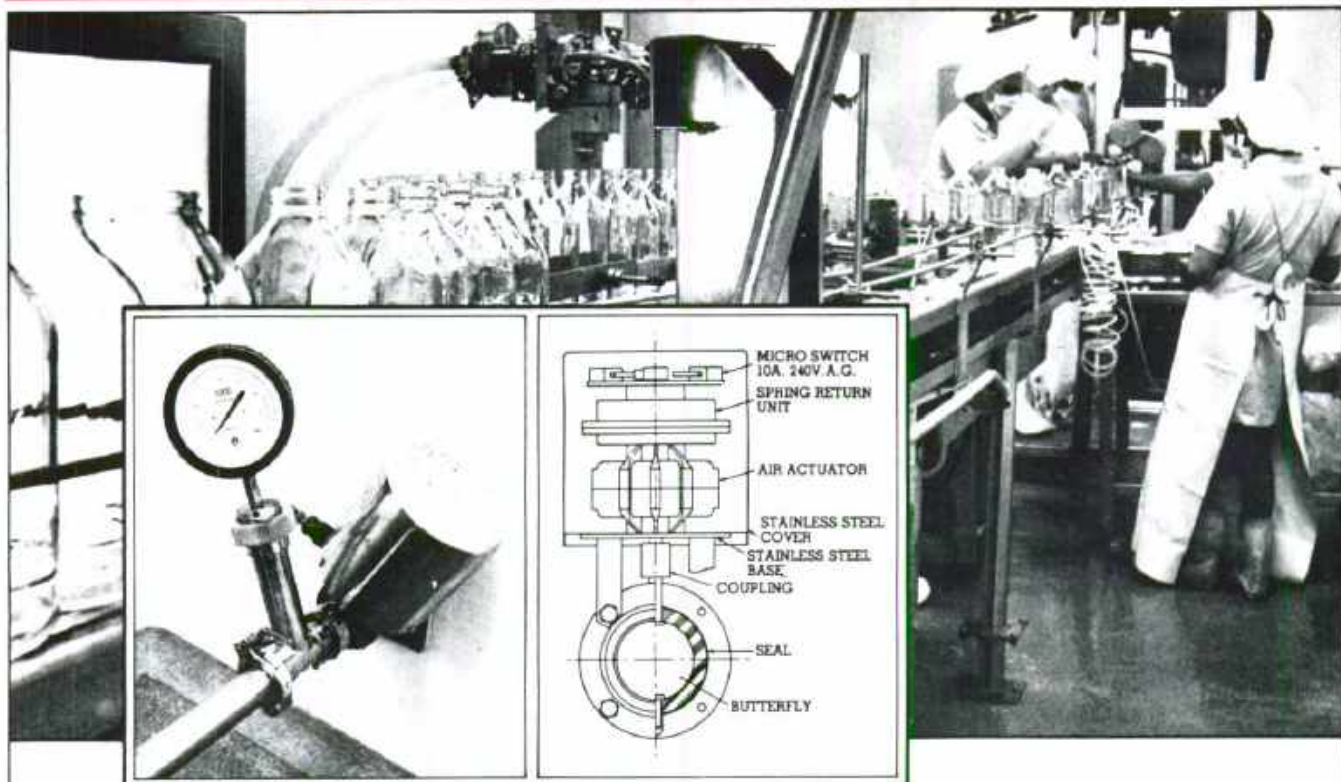
Klean-Flow III<sup>®</sup>, a molybdenum/nickel/chrome stainless steel valve is situated in-line and the automatic design, controls and seals the flow pattern. Ease of cleaning and the non-contaminating materials meet the criteria of closed system between bulk solution and final fill.

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