AICHE JOURNAL

OCTOBER 1998 • VOL. 44, NO. 10

The AIChE JOURNAL, a monthly publication of the American Institute of Chemical Engineers, is devoted to fundamental research and developments having immediate or potential value in chemical engineering.

EDITOR

Matthew V. Tirrell

MANAGING EDITOR

Haeja Lim Han

ASSOCIATE EDITORS

Mark A. Barteau

Edward L. Cussier

Julio M. Ottino

George Stephanopoulos

COPY EDITOR

Arthur H. Baulch

EDITORIAL ASSISTANTS

Clint Smith

Karen M. Simpson

CONSULTING EDITORS

L. S. Fan
Particle Technology

Alice P. Gast

Carol K. Hall

Thermodynamics

George E. Keller, II

Separations

Michael T. Klein Reaction Engineering

Douglas A. Lauffenburger Bioengineering

Glen H. Pearson

Materials Processing

Ronald W. Rousseau

Crystallization

John Seinfeld Environmental Engineering

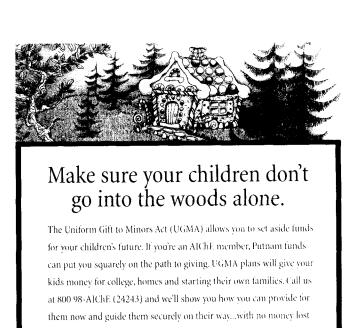
Michael Shuler

Biochemical Engineering

PUBLISHER

Stephen R. Smith

MARKETING MANAGER Lois Anne DeLong



PUTNAM CAPITAL
APPRECIATION-M
(Total Return)

1 Year Since
40.08% 3 Year Inception
- 31.30%

to sales charges or redemption fees.

PUTNAM VOYAGER-M
(Total Return)

1 Year
44.86%
3 Year
27.29%
Inception
27.31%

Call 800 98-AIChE (24243) for a free prospectus. AIChE members pay no initial sales charges and no redemption tess when howing Patriani bunds. Beause read the prospectus accetully before investing. The minutal timels are distributed by Marth & M. Lemina Securities Corporation.

All returns assume reinvestment of distributions at NAV and represent past performance, they do not grantative future results. Investment return and principal value will fluctuate so that an investor's shares when redeemed may be worth more or less than their original cost.

[Inaureia]

AIChE Journal (ISSN 0001-1541) is published monthly by the American Institute of Chemical Engineers, 3 Park Ave., New York, NY 10016-5901. Manuscripts should be submitted to Editor Matthew V. Tirrell at the Dept. of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN 55455, phone (612) 625-5823, fax (612) 624-6564. The statements and opinions in the AIChE Journal are those of the contributors, and AIChE assumes no responsibility for them. Annual subscription rates: \$715 for nonmembers, \$95 for members, and \$55 for student members; outside U.S., add \$80 for postage. Single copies: \$72; outside U.S., add \$8 for postage. Periodicals postage for domestic and air mail postage for foreign mailing paid at New York, NY and additional mailing offices. Copyright 1998 by the American Institute of Chemical Engineers. Subscribers are requested to give prompt notification of any change of address. Postmaster: Send changes of address to AIChE Journal, 3 Park Ave., New York, NY 10016-5901.

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by AIChE for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that a fee of \$15.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. This consent does not extend to copying for general distribution, for advertising or promotional purposes, for inclusion in a publication, or for resale. Articles published before 1988 are subject to the same copyright conditions. *AIChE Journal* fee code: 0001-1541/98 \$15.00 per article.