



In the effort to preserve and maintain the fragile ecology of our planet, these recently selected abstracts are presented to help readers of Journals of Materials Engineering and Performance stay current on legislation and compliance with global environmental issues and regulations. They are reprinted from Metals Abstracts and Materials Business File with permission from Materials Information, a joint service of ASM International<sup>®</sup>, Materials Park, Ohio, and the Institute of Materials, London, England.

**EPA May Team With Steel Industry for New Ideas.** Steel is a good bet to be one of the industries participating in a novel attempt to re-invent regulation. While re-inventing government is central theme of the Clinton administration, the EPA will invent a new approach to environmental watchdogging. The focus will be on the big picture of pollution, instead of monitoring air, water, and land pollution separately. It is not a sure thing that steel will be a formal participant in the EPA's Initiative for Commonsense Environmentalism. The program is just getting off the ground and an announcement is promised by early summer, 1994. Steel is a reasonable candidate because it is a major national industry that happens to be an across-the-board polluter.

B. Schmitt. Cited: *Am. Met. Mark.*, Vol 102 (No. 69), 12 April 1994, p 16 [in English]. ISSN: 0002-9998. PHOTOCOPY ORDER NUMBER: 199403-S7-0180.

**Double-Hull Tankers and Steel.** In recent years a succession of large oil spills caused by tanker accidents all over the globe has heightened worldwide concern over ocean pollution and its effect on marine life. As a result, international organizations have joined forces to mandate that all tankers be of double-hull construction. This has increased the amount of steel used in tankers and the amount of labor needed to build them. It has also altered the mix of steel materials used (increased use of high-strength steel) for the hull and its structural members, leading to continuous innovation in numerous areas.

Cited: *Steel Today and Tomorrow*, No. 124, Oct-Dec 1993, p 5-8 [in English]. PHOTOCOPY ORDER NUMBER: 199403-S6-0043.

**EPA's Chlorine Study Angers PVC Industry.** As part of its efforts to reauthorize the Clean Water Act (CWA), the US Environmental Protection Agency has asked Congress to back a study that would develop a national strategy for substituting, reducing or prohibiting the use of chlorine or chlorinated compounds. The proposed study has drawn a sharp response from the vinyl industry. EPA's move marks an unanticipated shift in the Clinton Administration's approach to chlorinated compounds, a class that includes polyvinyl chloride and other plastics. In late 1993, EPA had recommended against such a blanket ban before the International Joint Commission on the Great Lakes. The Vinyl Institute's Robert Burnett argues there is no scientific basis for phasing out the entire class of 15,000 chlorine-containing compounds. He says he is angered at what he terms EPA's exclusion of industry groups from the process of drawing up the study's goals. EPA calls for a task force to be set up to devise an impact assessment within six months, and to finalize a national strategy within 30 months of CWA reauthorization, a step now anticipated occurring in 1995. Cited: *Mod. Plast.*, Vol 71 (No. 3), Mar 1994, p 15 [in English]. ISSN: 0026-8275. PHOTOCOPY ORDER NUMBER: 199403-P4-0008.

**OSHA Reform Troubles Processors.** Whether the US Occupational Safety and Health Act (OSHA) will be revised any time soon is uncertain but, with the Clinton Administration's support earlier this year of reform legislation, plastics industry officials are bracing for a tough fight. The comprehensive OSHA reform measure would overhaul the way the nation's businesses run their health and safety programs. The proposal includes several provisions which the Society of the Plastics Industry, among other business trade and labor groups, oppose. The bills merge several concepts which labor supporters in Congress have previously presented as separate initiatives. The concepts, such as the acceleration of OSHA criminal penalties and additional whistle-blower protection measures were reintroduced last year in the reform measure. A major provision of the bill calls for companies with 11 or more employees to establish labor/management

committees to improve workplace safety. Committees would have authority in several areas including right to: investigate employee complaints and incidents resulting in worker deaths, injuries, illnesses or complaints; review the employer's safety and health records; and conduct periodic workplace inspections.

E. D'Amico. Cited: *Plast. World*, Vol 52 (No. 3), March 1994, p 13 [in English]. ISSN: 0032-1273. PHOTOCOPY ORDER NUMBER: 199403-P4-0007.

**Lead Looks Eagerly Ahead.** From a primary lead producer's perspective, 1993 was a disaster. Overall Western World fundamentals improved compared with 1992, but Pb prices on the LME fell to all-time lows. The LME cast price, for example, averaged only \$0.1811/lb in 1993, ranging from a low of \$0.1613 in October to a high of \$0.2201 in December. Brook Hunt and Associates, London, UK, reports that Pb prices last year, expressed in real terms, were 20% below any other annual average this century.

R.J. Garino. Cited: *ISRI Commod.*, Vol 94 (No. 7), April 1994, p 2 [in English]. PHOTOCOPY ORDER NUMBER: 199403-G8-0262.

**Alloys Used in Plumbing in for a Change.** The copper alloys used in plumbing products may face somewhat of a revolution as the US Environmental Protection Agency's Pb-Cu rule, legislative action, and a new standard are implemented in response to the EPA's concerns about small amounts of both Pb and Cu in drinking water. Lead levels of 50 µg/L were considered safe in the US until the 1991 EPA Pb-Cu rule established an action level of 15 µg/L. Therein lies the threat to the use of free-cutting brass rod and leaded cast brasses. The excellent machinability of free-cutting brass rod is due to the 3% Pb addition. The yellow and red brass castings used in plumbing hardware contain from ~1.5-7% Pb, for improved machinability and for pressure tightness. Alternative brass alloys will probably take some time to bring to market in large quantity and will be markedly more expensive.

A. Silber and D. Peters. Cited: *Am. Met. Mark.*, Vol 101 (No. 140), Suppl. Copper & Brass Service Centers, 17 March 1994, p 10A [in English]. ISSN: 0002-9998. PHOTOCOPY ORDER NUMBER: 199403-G6-0055.

**Alternative Solders for Electronic Assemblies.** Tin-lead alloys have dominated the world electronic soldering market for many years, due to their excellent soldering efficiency, proven reliability, and relatively low cost. This situation is now changing, however, owing to both environmental and technical concerns. With the former, there is a real possibility that in the near future, legislation will be introduced to restrict or even eliminate the use of Pb in electronics solders. On the technical side, there is a growing need for stronger, more fatigue resistant solder joints in surface mount applications, and also for solders that encompass a range of melting points to facilitate sequential or hierarchical-soldering operations. A number of promising alloys have been identified, including Sn-Bi-Ag, and a novel Sn-rich multicomponent system for which a patent application has been made.

*Focus on Tin*, Vol 4, 1993, p 6-7 [in English]. PHOTOCOPY ORDER NUMBER: 199403-G5-0032.

**Bill to Limit, Monitor Lead Emerges.** A bill aimed at reducing lead in the environment has popped up again on radar screens here, but it's neither an imminent danger to lead producers nor the sole risk factor lingering on Capitol Hill, according to an industry Congress watcher. The bill, a plan to ban some Pb uses and require the watchdogging of Pb products, was said to be a candidate for Senate floor action last week, although other legislative work precluded that. But Senator Harry Reid,

Democrat, Nevada, USA, the sponsor of the bill, continues to push it and a Senate vote this week remains a possibility, according to Reid's spokesman. The Lead Industries Association continues to oppose the bill and Jeffrey Miller, the LIA's director for government affairs, believes the chances of it winning congressional approval in its current form are very slim.

*Am. Met. Mark.*, Vol 102 (No. 55), 22 March 1994, p 7 [in English]. ISSN: 0002-9998. PHOTOCOPY ORDER NUMBER: 199403-G4-0016.

**Environmental Laws of Mexico.** Environmental regulation in Mexico has matured dramatically and effectively in the last decade. The gap between environmental regulation in the US and Mexico is rapidly narrowing. From a regulatory perspective, it is no longer necessarily less burdensome to operate in Mexico. Mexico has two principal environmental regulatory systems. The first consists of the laws and regulations governing domestic activities. The second consists of the treaties, agreements and understandings between the US and Mexico dealing with transboundary pollution and maquiladoras.

J.A. Holtkamp. Cited: *Min. Eng. (Colorado)*, Vol 46 (No. 4), April 1994, p 317-319. ISSN: 0026-5187. PHOTOCOPY ORDER NUMBER: 199403-G4-0014.

**Strategic Ramifications of Corporate Environmental Policy.** The minerals industry has been confronted by increasingly stringent environmental regulations that are significantly altering the economics of the industry. Heightened media attention, threats of litigation and decreasing support by the general public have exacerbated the industry's difficulties. Regardless of their merit, environmental issues present a serious threat to the continued viability of mining companies. Most of the changes in corporate environmental activities have been reactive. Pending regulations present formidable but uncertain technical requirements for compliance, and future regulatory developments are difficult to predict.

B.W. Cavender. Cited: *Min. Eng. (Colorado)*, Vol 46 (No. 3), March 1994, p 204-207. ISSN: 0026-5187. PHOTOCOPY ORDER NUMBER: 199403-G1-0059.

**An Assessment of the Release, Occurrence and Possible Effects of Plasticisers in the Environment.** Accurate statistical information together with a careful and practical analysis of loss mechanisms and routes have been used to make reliable estimates of plasticizer emissions to the environment. The emission sources examined include the production, use and final disposal of a wide range of flexible PVC articles as well as plasticizer production and distribution. The existing information on the environmental behavior of phthalates is critically reviewed and areas requiring further study identified. It is concluded that even though the total quantity of phthalates in existence continues to increase annually, the environmental burden is static or possibly decreasing.

D.F. Cadogan, M. Papez, A.C. Poppe, D.M. Pugh, and J. Scheubel. Cited: *PVC 93: The Future* (Brighton, UK), 27-29 April 1993, The Institute of Materials, London, 1993, p 260-274 [in English]. PHOTOCOPY ORDER NUMBER: 199403-G1-P-0037.

**Industrial Plastics: Theory and Application.** Chemistry, properties, testing, designing, processing, fabricating, tooling, and manufacturing of plastics are described. Materials addressed include heat and reinforced thermoplastic and thermosetting materials. Processing methods described include machining, molding, extrusion, laminating, reinforcing, casting, thermoforming, and coating. Health and safety aspects of plastics are addressed and appendices provide a glossary, trade name index, and material abbreviations. Discussion is oriented to the technician-level worker in the plastics industry.

T.L. Richardson. 2nd ed. (Retroactive Coverage). Delmar Publishers, 1989 [in English]. PHOTOCOPY ORDER NUMBER: 199403-G1-D-0029.

**Clean Air Act Amendments NO<sub>x</sub> Compliance Requirements—Glass Industry.** This paper simplifies the understanding of the NO<sub>x</sub> compliance requirements by summarizing requirements in a four-box matrix. To understand the impact of these regulations on a facility, one must know its location (attainment or nonattainment area) and whether the generating source is an existing or a new/modified source. Additionally, one must understand the significant differences between the three levels of control technology required: reasonably available control technology (RACT), best available control technology (BACT), and lowest achievable emission rate (LAER). This paper explains these relevant terms and, through the use of a four-box matrix, explains requirements for existing major sources (due by 31 May 1995) and for new/modified sources.

A.J. Gallo. Cited: 54th Conf. Glass Problems (Urbana, IL), 26-27 Oct 1993, *Ceram. Eng. Sci. Proc.*, Vol 15 (No. 2), March-April 1994, p 112-117 [in English]. ISSN: 0196-6219. PHOTOCOPY ORDER NUMBER: 199403-G1-C-0026.

**Method for Recycling Treatment of Refuse of Plastic Molded Articles and Apparatus Therefor.** The invention relates to a method for recycling treatment of refuse of plastic molded articles, e.g. polyethylene terephthalate bottles, and comprises immersing the refuse into hot water of 70-100 °C while agitating to detach and remove bottom coverings of dissimilar plastics, detaching paper labels on the plastic articles by steam injection, breaking the detached labels and the plastic bodies into fragments, separating the mixture by wind-force separating to remove most of the labels, further separating the plastic bodies and residual labels by flying separating to obtain the plastics bodies only, cleaning the fragments of plastics bodies by ultrasonic energy to remove all impurities, and preparing the purified plastics bodies as chip or pellet plastic material. An apparatus for performing the method is characterized by comprising a hot water tank and push impellers for immersing and agitating the refuse in hot water to detach and remove the coverings, a steam injection machine and an agitator for injecting steam against the labels to detach them, a wind-force separator and a flying separator for separating out the labels completely to obtain plastics bodies only, the former having guide plates and a blower, the latter having a flying rotary bar with fin members. The push impellers are of a square drum having vane-like projections.

H. Kashiwagi, Patent, Pub: 1 July 1992, Appl.: 27 June 1991, 1992 [in English]. PHOTOCOPY ORDER NUMBER: 199403-D1-P-0454.

**Clean Firing of Glass Furnaces Through the Use of Oxygen.** Many companies are presently considering 100% oxygen-fuel firing of glass melting furnaces. The question being asked regularly is whether oxyfuel is a niche solution to specific environmental issues or a trend that will change the primary glass melter. Several factors will ultimately determine the outcome, including air quality regulations, relative costs of electricity and natural gas, advancements in air separation, as well as the technical results achievable in glass melting.

P.B. Eleazer and A.G. Slavejkov. Cited: 54th Conf. Glass Problems (Urbana, IL), 26-27 Oct 1993, *Ceram. Eng. Sci. Proc.*, Vol 15 (No. 2), March-April 1994, p 159-174 [in English]. ISSN: 0196-6219. PHOTOCOPY ORDER NUMBER: 199403-D1-C-0346.

**Recycling of Electrostatic Precipitator Dust From Glass Furnaces.** Electrostatic precipitators have found wide acceptance in the glass industry for abating particulate discharge from glass furnaces. In the past, the relatively small amounts involved and the difficulties in handling the very fine, low-bulk-density material have made disposal in a landfill the least expensive method. Various efforts to improve the material handling characteristics, such as pelletization and roll compression, have had only mixed success. The required equipment is expensive and has high operating costs. Increasing disposal costs, legislative penalties, and spiraling raw material costs require reconsideration of the use of electrostatic precipitator (EP) dust as a batch material. In this paper, the choice of equipment, modifications to complement the existing facility, material characteristics of the collected dust, and the process requirements for two systems are described. Both systems successfully return EP dust to the batch house for incorporation into the glassmaking process with the use of dense-phase pneumatic conveying at Niles, Ohio, and dilute-phase, negative-pressure pneumatic conveying at Lexington, Kentucky. Operational experiences since the installation are discussed. The systems are recommended as possible solutions for meeting the environmental concerns of a glass plant. D.T. Boothe, H. Severin, and C. Braine. Cited: 54th Conf. Glass Problems (Urbana, IL), 26-27 Oct 1993, *Ceram. Eng. Sci. Proc.*, Vol 15 (No. 2), March-April 1994, p 62-72 [in English]. ISSN: 0196-6219. PHOTOCOPY ORDER NUMBER: 199403-D1-C-0344.

**HCl Formation via Pyrolytic Degradation of Polyvinyl Chloride (PVC): An Empirical Approach to Kinetic Modelling.** The pyrolysis of polyvinyl chloride (PVC) has been described in terms of a relatively simple kinetic model, based on a large number of laboratory tests. The model predictions are in good agreement with experimental data, regarding hydrochloric acid and non-condensable combustible gases. Therefore, the proposed model can be used to predict with good approximation the distributions of the above classes of compounds, in the whole range of applied experimental conditions.

M. Bisi, C. Nicoletta, E. Palazzi, M. Rovatti, and G. Ferraiolo. Cited: *Chem. Eng. Technol.*, Vol 17 (No. 1), Feb 1994, p 67-72. ISSN: 0930-7516. PHOTOCOPY ORDER NUMBER: 199403-C4-P-0087.

**Problems with Current Methodology in Using the Arrhenius Equation to Predict the Long-Term Behavior of Polymeric Materials in Geotechnical Environments.** Polymeric materials used in earth structures and waste containment sites have minimum performance requirements to be maintained over a service life ranging from 1-100 years. The ability to predict the material performance in these applications with time has great appeal. However, it is necessary to know the mode, mechanism,

and profile of behavior of these materials over an anticipated lifetime. Today, there is a proliferation in the use of rate expressions supposedly representing a material's response with time to a specific environmental condition. The impact of current protocol and simplifying assumptions on the prediction of long-term behavior of polymeric materials is reviewed.

D.G. Bright. Cited: *Advances in Fatigue Lifetime Predictive Techniques*, Vol 2, STP 1211, ASTM, Philadelphia, 1993, p 236-247 [in English]. PHOTOCOPY ORDER NUMBER: 199403-C1-P-0650.

### Furthermore . . .

A Big Three consortium will build a paint test facility at Ford Motor Company's Wixom, MI, assembly plant to **test the use of powder paints that reduce hydrocarbon emissions**. Wixom's current pilot test facility will be expanded by 60,000 sq. ft. for the consortium's dedicated facility which, by late 1995, will begin testing powder clearcoat paint, the final coat in an automotive paint process. **Chrysler Corp., Ford, and General Motors Corp.** have selected ABB Paint Finishing Inc. to engineer, build, and help operate the estimated \$20 million facility. For further information, contact Pam Kueber, Ford Motor Co., tel: 313/337-2456; Dick Thompson, General Motors Corp., tel: 810/986-5721; Chris Preuss, Chrysler Corp., tel: 810/576-8095; or Scott Fosgard, US-CAR, tel: 313/248-4298.

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Tests conducted by the U.S. Bureau of Mines show that **vitrifying wastes—melting them into a glass or crystalline form—safely detoxifies them**. Working with the American Society of Mechanical Engineers, the USBM melted large samples of municipal waste ash in an electric arc furnace and evaluated the glass produced. "Metals can't leach out because they are permanently bound in the glass, and you reduce the volume of the original waste by 90%," explained USBM researcher Paul Turner. "At worst, you can safely landfill a smaller amount of waste without special handling

or extra cost. But you also have a glass that instead can be made into roadbed aggregate or other products. For information, contact Sandra Cleva, USBM, Office of Public Information, Mail Stop 1040, 810 Seventh Street, NW, Washington, DC 20241; tel: 202/501-9649.

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The Swedish industrial gas company **AGA AB** and German furnace supplier **MAN GHH** announced that they will cooperate in **worldwide marketing efforts geared to the environmental and efficiency concerns of the aluminum industry**. AGA's latest combustion technologies will be combined with MAN's wide experience in designing, building, and installing furnace systems. The cooperation agreement will give companies in the aluminum industry a more straightforward way to improve performance in such areas as emissions, fuel efficiency, and dross recovery. For further information, contact Anders Johnson, AGA AB Process Metallurgy, Postfach 201954, D-20209 Hamburg, Germany; tel: 49/4042 105 307; fax: 49/4042 105 301; or Klaus J. Detzner, MAN GHH, MAN Gutehoffnungshütte AG, Industrial Engineering Division, Bahnhofstrasse 66, D-46145 Oberhausen, Germany; tel: 49/208 692 2968; fax: 49/208 692 2013.

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