

LEAD INDUSTRIES ASSOCIATION, INC.

202 MADISON AVENUE

NEW YORK, N. Y. 10017

January 17, 1964

SUBJECT: SUPPLEMENT TO
LEAD IN THE CERAMIC INDUSTRIES

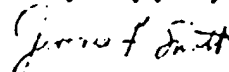
To Members of the Lead Industries Association, Inc.:

Enclosed is a press release and the latest supplement to our ceramic data book, LEAD IN THE CERAMIC INDUSTRIES. The release, which briefly describes the supplement, was sent to the appropriate trade journals, newspapers and magazines.

The supplement has been mailed to all who now possess the binder, and single copies will be offered in response to inquiries generated by the release and publicity in LEAD magazine. As we note in the release, it is expected that this supplement will be of assistance not only to researchers in the electroceramics field, but also in such miscellaneous fields as glass, enamels and glazes.

Data for the supplement was developed under research directed by the International Lead Zinc Research Organization and carried out at the Pennsylvania State University. The Supplement was prepared by Jerome Smith of our staff with the cooperation of F. A. Hummel and the Ceramics Technical Committee.

Very truly yours,


Jerome F. Smith

JFS/kh



Look Ahead with Lead

NEWS From



Lead Industries Association, Inc.

292 Madison Avenue

Look Ahead with Lead

New York 17, N.Y.—OR 9-6020

RELEASE:

Immediate

1/17/64

LIA - 123 (12-16)

Further Information:

Jerome Smith

NEW DATA FOR ELECTROCERAMICS RESEARCH

New technical data of special interest in the relatively undeveloped fields of high frequency insulators, low loss dielectrics, low dielectric constant and zero moisture absorption ceramics are now available.

Considerable effort has been devoted in the electroceramics field towards the development of bodies and glasses with the desired characteristics, and this new publication on phase diagrams gives results of some of this work.

To assist further research and as a basis for immediate application, a one-page summary of important data in the system $PbO-BaO-MgO-SiO_2$ has just been issued by the Lead Industries Association, Inc., 292 Madison Avenue, New York, N.Y. (10017). Eight diagrams from this system, two ternary and six binary, have been selected for publication from the thesis of J. F. Argyle.

Mr. Argyle was working under grants from the International Lead Zinc Research Organization at The Pennsylvania State University for the period August, 1958 to June, 1963, and his work was directed by Professor F. A. Hummel, Head of the Department of Ceramic Technology.

It is expected that these diagrams will also serve as a basis for further research in such areas as glass technology, enamels, and glazes. The data sheet was issued as a supplement to the ceramic data book, LEAD IN THE CERAMIC INDUSTRIES. A single copy may be obtained free of charge by writing the Lead Industries Association at the above address.

EDITOR'S NOTE. If you would like a copy of this supplement or if you would like a copy of LEAD IN THE CERAMIC INDUSTRIES, please feel free to write or call.

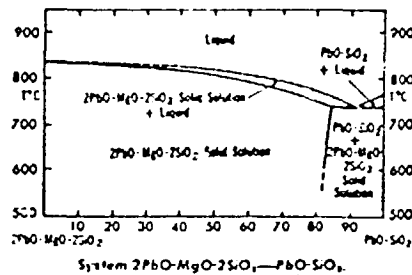
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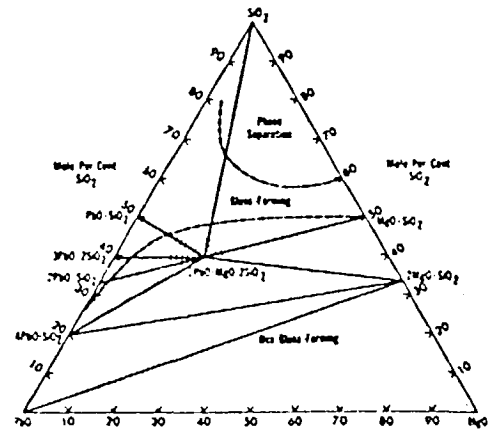
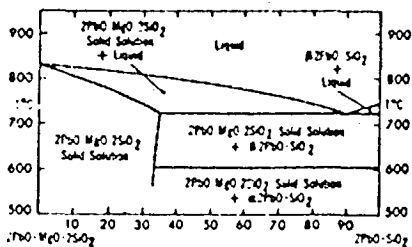
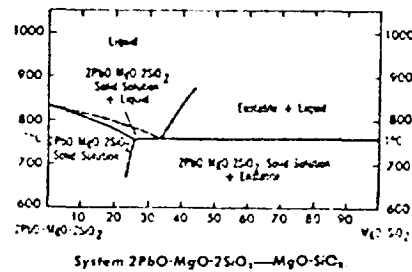
EXPLANATION OF DIAGRAMS



The following phase diagrams have been extracted from the Ph.D. thesis of J. E. Argyle and have been provided in their present form through the cooperation of J. A. Hummel. Argyle was a Lead Industries Association Fellow during the period August, 1958 to June, 1963, working under grants from the International Lead Zinc Research Organization and directed by J. A. Hummel, Professor and Head of the Department of Ceramic Technology at The Pennsylvania State University.

The title of the thesis was, "Glass-Formation, Phase Relationships and Dielectric Properties of Some Phases in the System PbO-BaO-MgO-SiO_2 ." These phase diagrams and several others not included in the present collection are expected to appear later in papers abstracted from the thesis which will be submitted to the *Journal of the American Ceramic Society* for publication.

During the course of the thesis work mentioned above, sub-solidus phase relationships were determined for the three primary ternary systems, PbO-MgO-SiO_2 , PbO-BaO-SiO_2 , and BaO-MgO-SiO_2 , as a basis for measurement of electrical properties of compositions



Glass formation, phase separation and sub-solidus phase relationships in system PbO-MgO-SiO_2 .

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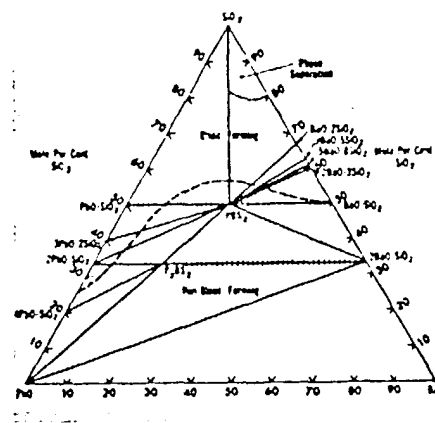
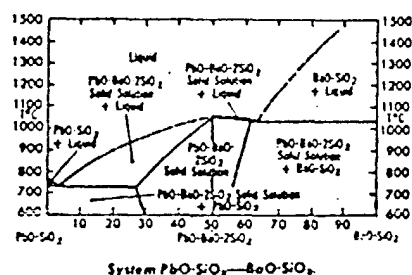
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PHASE
DIAGRAMS

November 1963



in the quaternary system $PbO-BaO-MgO-SiO_2$.

Liquidus and sub-solidus relationships were also determined along three joins in the system $PbO-BaO-SiO_2$ and along five joins in the system $PbO-MgO-SiO_2$, all of latter involving the ternary compound $2PbO-MgO-2SiO_2$.

For the present purpose, eight of the most important diagrams have been selected and presented as a basis for immediate application or for further research in the electroceramics area or in other miscellaneous fields such as glass, enamels, and glazes. Compositions are expressed in mole per cent and temperatures in degrees Centigrade. Cross-hatching along joins in the two ternary systems indicates the extent of solid solution, following previously established custom. Dashed lines in the ternary systems indicate approximate limits of glass formation or approximate limits of liquid phase-

separating areas in the high-silica region. Dashed lines in the six subsidiary binary systems indicate uncertainties in the position of liquidus or solidus boundaries. It will be recognized by some readers that the diagrams are not complete, lacking liquidus data in the ternary systems and providing only limited liquidus data in the binary systems; therefore the usual additions and corrections can be expected in the future, as in the case of most published diagrams of this type.

As a final note, it should be pointed out that the diagrams do serve two of the primary purposes of the International Lead-Zinc Research Organization, and the Lead Industries Association, Inc.; that is, 1) to make available the results of research on lead compounds which might be useful to industry, and 2) to support research in order to fill some of the gaps which exist in the science and technology of lead oxide and its compounds.

