

**STEWART'S
SCIENTIFIC
DICTIONARY**

STEWART'S SCIENTIFIC DICTIONARY

FOURTH EDITION

PREVIOUSLY TITLED THE NATIONAL PAINT DICTIONARY

By
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DEFINITIONS OF TERMS
AND SCIENTIFIC MATERIALS
USED IN THE
CHEMICAL PROCESS INDUSTRIES

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FOURTH EDITION
1953

FOREWORD

WHEN the first edition of this volume appeared in 1940, it alleviated a great deal of confusion and misunderstanding that existed in the Chemical Process Industries concerning the meaning of technical and scientific terms used prior to its publication. This revision, as in the case of the three previous editions, reflects the determination and the indefatigable spirit of the author to keep pace with the technological expansion and improvements in the field.

In this fourth edition, the author has included, after exhaustive research, not only descriptive or generic terms, but also names of the more widely used raw materials consumed by the Chemical Process Industries. Both suppliers and consumers of these industries will find it an invaluable reference book. Every library, laboratory, plant and sales office in the various branches of the Chemical Process Industries should have a copy of Stewart's Scientific Dictionary alongside Webster's for quick reference.

Although previous editions of this book have brought the Chemical Industry much nearer to a uniform terminology than ever before, the need for a careful perusal of the new volume remains. The vast amount of material included here, for the first time, shows not only the increased scope of this publication, but also the tremendous technological and scientific strides that have been made in the Chemical Process Industries since the previous edition.

No one employed in research, production, sales, testing, legal patent investigations, teaching, or library work needs to be reminded of the loss of time, money and effort that can result from a misunderstanding and misuse of technical and scientific terms. For this reason, this volume should prove invaluable, since it will help to eliminate this confusion.

*Austin O. Allen, Vice President
in charge of Manufacturing and
Research, Vita-Var Corporation.*

Newark, N. J.
August, 1953

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PREFACE TO THE FOURTH EDITION

THE purpose of this reference volume is to provide authentic, concise, and practical information of interest to manufacturers, educational institutions, industrial consumers, and all those concerned with the materials used by the various Chemical Process Industries. This fourth edition has not reached the stage where it is intended to be an exhaustive scientific manual of an encyclopedic nature. However, it is proposed and intended that it will acquire such status in some future edition. Rather, this book is intended to fill a definite and practical need of the Chemical Process Industries:

First, for those engaged in the formulation, manufacture, and merchandising of finished products such as adhesives, plastics, paints, varnishes, lacquers, natural rubbers, synthetic rubbers, and their compounds, petroleum products, soaps, detergents, textiles, insecticides, fungicides, packaging materials, ceramics, etc.;

Second, for those tens of thousands of industrial consumers of these same products throughout the world;

Third, for those technical or scientific men and laymen who require a handy reference volume as a source of information for use in technical writing and specification work;

Fourth, for those readers who have an inherent curiosity regarding the meaning of terms and description of materials used in the Chemical Process Industries;

Fifth, finally, and probably of the utmost importance to many readers, to provide a source for the definition of terms seldom found in the usual desk or library dictionary.

In general, this revision follows the pattern adopted for the three earlier editions with the exception of the major policy, in that it encompasses a much larger field. Previous editions specialized in defining terms used only in the Protective and Decorative Coatings Industry, which included industrial materials such as paints, varnishes, lacquers, pigments, dry colors, vegetable oils, plasticizers, driers, wetting agents, etc. This edition attempts to integrate and embrace all of the terms used in the Chemical Process Industries, in answer to a demand for such a publication. This procedure

is the natural course to follow in view of the fact that there is such a great overlapping and interdependence among the various industries. It is therefore difficult, if not impossible, to establish where one segment of the Chemical Process Industries terminates and the next one begins. A good example of this overlapping is the relationship between the Plastics, Paint, and Synthetic Rubber Industries. Certain plastics are used in the Textile Industry; synthetic rubber in the form of a copolymer of butadiene and styrene is used in "latex" paints; plastics (synthetic resins) similarly are used in the Protective Coatings Industry. This indispensable and rather fortunate interrelationship among the different industries is considered as ample justification for expanding the scope of this volume.

This new edition includes also some old terms which were inadvertently omitted in the first three editions, and many new terms which have been developed during the period since World War II. The style and format have been improved in an effort to comply with suggestions emanating from the various Chemical Process Industries as a result of an extensive survey of those Industries.

At the expense of a great deal of time and money, the method for securing information for this edition likewise has been improved over previous works. Although the bulk of the research work was done at the Library of Congress in Washington, D. C., in the manner used by most lexicographers, much additional information was obtained from a "cross section" of the opinion of leading technical and scientific men. Through their generous cooperation, manufacturers' descriptions of industrial products were obtained, and were then paraphrased by the author to resolve any conflicting definitions or interpretations.

With reference to the trade names listed, it should be noted that they do not necessarily indicate that the given product has been registered in the U. S. Patent Office. They may include proprietary names which have or have not been legally protected by a trade mark registration. For obvious reasons, no distinction between the two is made in this volume.

It is conceded that every trade product or industrial material used in the Chemical Process Industries is not listed in this publication. Although the writer exerted every effort to prevent such omissions, there were a few instances in which manufacturers or suppliers failed to submit information regarding their products in response to repeated invitations in time to be included in this revision. With the exception of the values listed regarding the physical and

chemical properties of raw materials and finished products, responsibility for the contents of this book rests with the author. It must be remembered, however, that in spite of every precaution taken, certain omissions are practically unavoidable. In this respect, critical and constructive comments and suggestions from the users of this volume will always be welcomed by both the author and the publishers.

It is the sincere desire that this dictionary will prove to be a significant contribution to the scientific and economic knowledge of the Chemical Process Industries. In particular, it is hoped that all people in all the nations of the world who have selected chemical technology as their life work and study, will find this volume of some assistance.

Jeffrey R. Stewart, F. A. I. C.

Library of Congress, Washington, D. C.

and

Stewart Research Laboratory, Alexandria, Va.

August, 1953

ACKNOWLEDGMENT

IT is obvious that for any one person to attempt to write, edit and publish a technical book such as this, would be difficult if not impossible. The author, therefore, has secured the services and advice of the following qualified sources to aid in formulating the various technical definitions. As has been pointed out in the "Preface," the definitions in this volume are not the personal opinion of one person, but a general "cross section" of the opinion of thousands of chemists, engineers and technologists in the Chemical Process Industries.

Eugene F. Hickson, retired and formerly Chief of the Paint, Varnish and Lacquer Section of the National Bureau of Standards reviewed that part of the manuscript that dealt with terms used in the Protective and Coatings Industry, before it was set into type. This made it possible to increase the scope and to make the book more inviting. Mr. Hickson's suggestions and ideas are the reflection of the general thought of technologists and engineers in the employ of the Federal Government.

Grateful acknowledgement is also extended to the American Society for Testing Materials for their extensive and unselfish cooperation. The Society granted permission to use those definitions from the Book of A.S.T.M. Standards that were applicable to the Chemical Process Industries. This fourth edition contains most of the A.S.T.M. definitions relevant to this field.

Although the above have supplied a great deal of information, suggestions and ideas, this volume would have been much more difficult to prepare if it were not for the aid of the following individuals to whom grateful acknowledgement is extended:

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WASHINGTON, D. C.

AND

ALEXANDRIA, VA.

Jeffrey R. Stewart

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AA CASTOR OIL: The trade name for specially processed No. 1 castor oil of a quality that meets U. S. P. specifications. AA Castor Oil is manufactured by the Baker Castor Oil Company, 120 Broadway, New York 5, N. Y.

ABALYN: The trade name for the methyl ester of rosin. Its major single component is methyl abietate. It is a light-colored, liquid resin which is used as a plasticizer, a cosolvent plasticizer and as a resin extender. Abalyn is also used in lacquers and as a modifier in asphalt compositions. It is produced by Hercules Powder Company.

ABBÉ REFRACTOMETER: A common form of refractometer used for determining the refractive index of oils and other liquids, or of grease-like products which are capable of liquefaction at moderate temperatures. Good accuracy is attainable in the range of 1.3 to 1.7, readings are given to the fourth decimal place. The prisms, which constitute the most important part of the instrument, and hence the liquid held between their faces, are capable of being maintained accurately at the temperature of the determination.

ABIETIC ACID: The principal acid formed by the isomerization of resin acids present in gum and wood rosin. The term abietic acid is often used to signify all of the resin acids present in rosin. It has a melting point of 182°C., and is used either in crystalline or in transparent and vitreous (amorphous) form.

ABIETOLENE: A pine tree product used as a solvent for rosin, modified phenolic resins, para-coumarone indene resins, and concentrated phenolics. It is also used as a plasticizer in varnishes of low oil length.

ABIETYL ALCOHOL: See "abitol."

ABITOL: The trade name for hydroabietyl alcohol produced by Hercules Powder Company. A primary alcohol derived from rosin, Abitol is resinous in character and is indicated as a plasticizer and resin modifier for specialty products in the protective coating field.

ABOPON: The trade name for a stabilizer and wetting agent. It is used as a sealer for porous surfaces prior to painting. In the manufacture of pigments, it is used to aid the soft grinding of the pigments (greens, chrome

ABOPON—*Continued*

yellow, and iron blues), in which case it is introduced into the acid slurry water. The pH of the slurry is usually controlled as closely as possible to about 5-6 in order to get fine particle size precipitates. Abopon is also used as a flameproofing agent. The addition of 1.5 per cent to 2.5 per cent Abopon to the water phase of a lacquer emulsion, using a wetting agent and sulphonated castor oil as the emulsifying medium, increases the stability of the emulsion without substantially impairing the properties of the lacquer film.

ABRACOL: The trade name for para toluene sulfanilide which is a white, crystalline solid sometimes used as a plasticizer in lacquers.

ABRASIN OIL: The name used in French Indo-China for tung oil produced from the seeds of the *Aleurites montana* tree, also known as the wood oil tree. The trade makes no distinction between the tung oil secured from this tree and that secured from *Aleurites fordii*. The oil from both species of trees are frequently mixed for export purposes. See "tung oil."

ABRASIOMETER: A scientific device which is used to determine quantitatively the abrasion resistance of a protective coating. This is usually done by measuring the time required for an abrasive to wear a film of known thickness under standardized conditions.

ABRASION OF REFRACTORIES: The wearing away of refractory surfaces by the scouring action of moving solids.

ABRASION RESISTANCE: That property of a surface by which it resists being worn away as the result of friction. This is not necessarily related to the hardness of the surface, but is more often correlated with its toughness. Rubber tires provide an excellent example of abrasion resistance derived from toughness rather than hardness.

ABRASIVE: The converse of "lubricant." Any hard, sharp material which wears away a softer, less resistant surface when the two are rubbed together. This term embraces sharpening stones, grinding wheels, and when on flexible backings, are more scientifically known as "coated abrasives." This is a more proper term than "sandpaper." The most commonly known of all coated natural abrasives is flint paper, which is the "everyday" product which is sold in the hardware and paint stores, and which the layman calls "sandpaper." This is the oldest type in general

usage. Garnet and emery are other natural abrasives which are used rather extensively. Of the artificial abrasives, aluminum oxide is the most widely used. Silicon carbide is the next most important.

Mild abrasives, such as pumice, rottenstone, silica, fine textured sandpaper, chalk, rouge, steel wool, are often used to rub rough surfaces to a smooth film, and also to contribute to the desirable "rubbed" finish, sometimes referred to as "depth of finish."

While Webster offers a satisfactory definition of this term insofar as the layman is concerned, a different interpretation is desirable for industrial or scientific purposes. Actually, in modern times (1953) an abrasive is a cutting tool, or more accurately, a series of cutting tools, since most abrasives are either joined together in a cohesive mass with a binder or adhered to a backing. Actually, under a microscope, each abrasive particle is an individual tool, just as a chisel might be.

The quality of an abrasive is determined by (1) Its effectiveness as a cutting tool. (2) Its ability to stand up under continuous cutting action. (3) Its ability to fracture or break down in such a fashion that it remains a cutting tool instead of dulling the surface abraded. Silicon carbide, for instance, is an exceptionally fine abrasive from the standpoint of cutting power, and its ability to fracture so that new cutting faces are formed. But, being brittle, it does not stand up well under heavy grinding. Aluminum oxide, on the other hand, fractures into particles a little more blocky, and as a result, is not quite so effective in cutting action. However, due to the extreme toughness, this mineral is the most extensively used of all abrasives in the grinding and finishing of metals. Natural abrasives include diamond, emery, corundum, sand, garnet, tripoli, and quartz.

ABSOLUTE: In chemical terminology, this word signifies pure or free from admixture with any other material; it is often used with reference to alcohol, which is free from impurities, diluents, water, etc. In the terminology of physics, it signifies independent of arbitrary standards; it may also refer to fundamental units: for example, the absolute viscosity of a varnish or oil is expressed in poises or units of the C.G.S. (centimeter-gram-second) system.

ABSOLUTE HUMIDITY: The weight of water vapor present in a unit volume of air. For example, grains per cubic foot, or grams per cubic meter. The amount of water vapor is also reported in terms of weight per unit weight of air, for example, grains per pound of dry air. This value differs from values calculated on a volume basis and