The Role Of Relative Humidity In Corrosion

Moisture analysis covers a variety of methods for measuring high levels of moisture, as well as trace amounts, in solids, liquids, or gases. There are many applications where trace moisture measurements are indispensable for manufacturing and for process quality assurance. Trace moisture in solids must be controlled for plastics, pharmaceuticals and heat treatment processes. Measurement applications in gases and liquids include, for example, drying processes, hydrocarbon processing, pure gases in the semiconductor industry, natural gas pipeline transport, the conditioning of food and other products. Written by experts with over 20 years of experience in the field, this one-stop guide covers all aspects of these measurements, including both the theory and a wealth of practical know-how. As such, it includes guidelines on installation, on the realization of standards for absolute and relative humidity, verification and traceability measurements, equipment calibration methods and the latest research developments. Backed by numerous case studies, this practical book serves the needs of those working in the industry tasked with performing or developing new techniques and processes for moisture and humidity measurement. As a result, the scientist or engineer has all the information required for accurate, reliable, economically viable and efficient moisture measurement.

This state-of-the-art volume covers the latest and future trends in measuring, monitoring and modeling the properties of cement based materials. The book contains 94 papers and presents the latest research work of renowned experts. It acts as a survey of the most up-to-date research in the field.

Microbial pollution is a key element of indoor air pollution. It is caused by hundreds of species of bacteria and fungi, in particular filamentous fungi (mould), growing indoors when sufficient moisture is available. This document provides a comprehensive review of the scientific evidence on health problems associated with building moisture and biological agents. The review concludes that the most important effects are increased prevalences of respiratory symptoms, allergies and asthma as well as perturbation of the immunological system. The document also summarizes the available information on the conditions that determine the presence of mould and measures to control their growth indoors. WHO guidelines for protecting public health are formulated on the basis of the review. The most important means for avoiding adverse health effects is the prevention (or minimization) of persistent dampness and microbial growth on interior surfaces and in building structures. [Ed.]

Because of unique water properties, humidity affects many living organisms, including humans and materials. Humidity control is important in various fields, from production management to creating a comfortable living environment. The second volume of The Handbook of Humidity Measurement is entirely devoted to the consideration of different types of solid-state devices developed for humidity measurement. This volume discusses the advantages and disadvantages about the capacitive, resistive, gravimetric, hygrometric, field ionization, microwave, Schottky barrier, Kelvin probe, field-effect transistor, solid-state electrochemical, and thermal conductivity-based humidity sensors. Additional features include: Provides a comprehensive analysis of the properties of humidity-sensitive materials, used for the development of such devices. Describes numerous strategies for the fabrication and characterization of humidity sensitive materials and sensing structures used in sensor applications. Explores new approaches proposed for the development of humidity sensors. Considers conventional devices such as phsychometers, gravimetric, mechanical (hair), electrolytic, child mirror hygrometers, etc., which were used for the measurement of humidity for several centuries. Handbook of Humidity Measurement, Volume 2: Electronic and Electrical Humidity Sensors provides valuable information for practicing engineers, measurement experts, laboratory technicians, project managers in industries and national laboratories, as well as university students and professors interested in solutions to humidity measurement tasks as well as in understanding fundamentals of any gas sensor operation and development.

Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.

The state of development of composite materials is quite unique in the scientific world with simultaneous advances being made both in their usage and basic understanding. The complexity and high technology required in manufacturing structural parts with these materials as well as the need for fundamental description of their processing and property characteristics necessitates a close col laboration between industrial and academic researchers. This col laboration has become significant not only in solving specific tech nical problems, but in providing a much needed supply of scientists with training and background focused on anticipated demand for further advances in composite usage. The fact that the transportation industry with its current international character has a vital interest in composite materials for weight savings applications has provided a strong incentive for extending these developments beyond national boundaries. An excel lent example of an established international venture is the building of the new generation commercial aircraft by the Boeing Company with composite parts manufactured by Aerita1ia in Italy. Accordingly, we organized a Joint U. S. -Italy Symposium on Composite Materials in Italy which was successfully held on June 15-19, 1981, under the primary sponsorship of NSF in the U. S. A. and CNR in Italy. The strong support we also received from industrial co-sponsors, both from Italy and the U. S. A. , as well as our respective academic insti tutions gave us confidence that we were addressing a timely and important area in Science and Engineering with a unique concept.

Relative humidity is a term used to describe the amount of water vapour that exists in a gaseous mixture of air and water vapour. The relative humidity of an air-water mixture is defined as the ratio of the partial pressure of water vapour in the mixture to the saturated vapour pressure of water at a prescribed temperature. This book presents current research in the study of relative humidity, including humidity-sensitive and non-ohmic tin dioxide ceramics; optics of airborne particles under elevated humidity conditions; a review of relative humidity management and its environmental effects; relative humidity effects in a spa; and relative humidity modelled by a functional network.

The first volume of The Handbook of Humidity Measurement focuses on the review of devices based on optical principles of measurement such as optical UV, fluorescence hygrometers, optical and fiber-optic sensors of various types. Numerous methods for monitoring the atmosphere have been developed in recent years, based on measuring the absorption of electromagnetic field in different spectral ranges. These methods, covering the optical (FTIR and Lidar techniques), as well as a microwave and THz ranges are discussed in detail in this volume. The role of humidity-sensitive materials in optical and fiber-optic sensors is also detailed. This volume describes the reasons for controlling the humidity, features of water and water vapors, and units used for humidity measurement.

The book will be focused on the three most important aspects of food packaging: Modeling, Materials and Packaging Strategies. The modeling section will provide a complete overview of mass transport phenomena in polymers intended for food packaging applications. The materials section will cover the most interesting problem-solving solutions in the field of food packaging, i.e., low environmental impact active films with antimicrobial activity. Lastly, the packaging section will provide an overview of the most recent approaches used to prolong the shelf life of several food products.

With data for selected U.S. and foreign stations.
The drying of cementitious materials is of interest in volume change (i.e., shrinkage) research. However, the movement of water due to drying and wetting also plays a significant role in many durability related problems (e.g., corrosion, alkali silica reactivity, freezing and thawing). Many factors can influence the drying and wetting process in concrete including: pore structure, environmental conditions, and liquid properties. This paper describes the influence of the liquid properties on the drying process. Specifically, this work examines the non-linear moisture diffusion coefficient that is used in a differential equation that describes drying. This paper describes how the non-linear moisture diffusion coefficient is influenced by the presence of deicing salts solutions. The relationship between the equilibrium relative humidity and the solution properties is also discussed in this paper. A higher degree of saturation was observed for the samples containing deicing salt solutions, as compared to the plain samples at any given humidity. The presence of deicing salt causes a shift of the non-linear moisture diffusion coefficient as a function of relative humidity. The non-linear moisture diffusion coefficient curves have near zero rates of drying at low relative humidity with a rapid increase in drying rate as the relative humidity is increased (especially near the equilibrium relative humidity) followed by diffusion coefficient of 0 between RHeq and 100% RH.
Premature concrete deterioration due to alkali-silica reaction (ASR) and delayed ettringite formation (DEF) is a significant problem all over the world. In cases where these mechanisms were not initially prevented, mitigation is critical to halt expansion and cracking. The main objectives of the research presented herein were to study the effect of ambient relative humidity (RH) on rates of concrete expansion, to determine RH thresholds below which expansion due to ASR and/or DEF may be suppressed, and to evaluate coatings intended to lower the internal RH of concrete and thus minimize future potential for damage. Results from testing showed that the RH threshold for ASR was below 82%, the RH threshold for DEF was below 92%, and the RH threshold for combined ASR and DEF could be about 83% for the materials tested. Furthermore, it was shown that some coatings are effective in reducing ASR- and DEF-related expansion by lowering the internal RH of concrete.