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Study on the Role of Stoichiometry in Quality Management

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Abstract: In recent years, with the continuous development of the society, people's requirements for product quality are getting higher and higher. Enterprises pay more and more attention to the quality management work, and take the corresponding quality management measures, established the quality management system. It is found that the current stoichiometry technology plays an important role in quality management, and the product quality has been significantly improved. Therefore, the author deeply thinks and analyzes the influence of stoichiometry on product quality and its role in quality management, and studies how to optimize the application of stoichiometry technology in quality management, in order to open up ideas for improving the efficiency of quality management.

Keywords: Stoichiometry; Quality Management; Technology Application Function.

1. Introduction

Stoichiometry is used to calculate the specific amount of a chemical reaction. In general, these quantities have close direct relations with multiple variables such as physics and chemistry, and this relationship is described based on the relationship between quantity and energy in chemical changes. Because stoichiometry can accurately describe the multiple relationships between quantity and variables, it has been widely used in quality management work in scientific research, food, medicine, and chemical industry [1]. Using stoichiometric technology can fully test all parameters of the product, to ensure that the product quality meet the industry requirements, so we need to further study the role of stoichiometric technology in quality management, improve the stoichiometric level, improve the accuracy of the stoichiometric result data, so as to improve the enterprise quality management efficiency to lay a good foundation.

2. Analysis of the Stoichiometric Effect on Product Quality

According to the investigation and analysis, the important influence of stoichiometry on product quality is mainly reflected in the following three aspects.

2.1. Comprehensive Analysis of the Product Parameters to Ensure That the Product Quality Meets the Industry Requirements.

Through the stoichiometric work, the detection parameters of different types of products can be determined in advance to ensure the smooth progress of the testing process. In the production process of an enterprise, the stoichiometry has a great influence on the product quality. Improving product quality can not only bring more economic benefits to enterprises, but also improve the visibility of enterprises. For different enterprises, there are certain differences in product types, and there are also significant differences in the parameters that need to be measured. Stoichiometric comprehensive detection of the main parameters of the product. By analyzing the parameter data, judge whether the product quality meets the industry regulations and relevant standards. At present, some enterprises do not pay enough attention to stoichiometry, and lack of professional testing methods and equipment, which affects the accuracy of testing parameters, leads to many products do not meet the industry standards, and brings many risks to the production and operation of enterprises. To solve this problem, it is necessary to strengthen the research on the measured parameters, adopt reasonable detection methods, and use advanced detection equipment.

2.2. Improving the Level of Stoichiometric Technology Can Better Guarantee Product Quality.

At present, in the stoichiometry process of the product, not only need to comprehensively detect the product parameters, but also to supervise the relevant production process and control process of the product. Generally, when testing the quality of products, it is necessary to conduct the corresponding test according to the measured parameters informed in advance, and clarify the change range of the parameters. If the test result data exceeds the specified standard range, it means that the product parameters are not up to the standard and the product is unqualified. When controlling the parameters of the product production process, it is also necessary to clearly stipulate the scope of testing and compare the parameters to ensure that the product quality meets the relevant industry standards. At present, in the stoichiometry process, the testing equipment needed to rely on is mainly measuring instruments. Because different types of measuring instruments have different accuracy, more advanced and reasonable measuring instruments should be selected. In the stoichiometry of products, the use of advanced measuring instruments may increase the investment cost of some enterprises, but can better ensure the quality of products, improve the overall image of enterprises.

2.3. The Precision of the Measuring Instrument has an Important Influence on the Product Quality.

The accuracy of measuring instruments is relatively affected by many factors, such as the standardization of the installation process of measuring instruments, the rigor of the debugging process and the rationality of the maintenance measures in the later period, which will have a certain impact on their detection accuracy. Relevant personnel must comprehensively check the installation process of measuring instruments in advance, and carry out rigorous debugging according to the specifications and types of products, so as to ensure the more standardized use of measuring instruments and improve the accuracy of measuring data results. Enterprises should conduct comprehensive training for the operators of measuring instruments in advance to ensure that the relevant personnel can clearly understand the operation specifications and matters needing attention of the relevant equipment. Enterprises should also attach great importance to the maintenance of measuring instruments, take reasonable maintenance measures, to ensure that they can be long-term stable and reliable operation, so as to better ensure the quality of products.

3. Analysis of the Role of Stoichiometric Technology in Quality Management

With the rapid development of market economy, the inventory of various products is increasing, the market gradually enters the saturation stage, and the competition is becoming increasingly fierce. In order to stand firm in the fiercely competitive market, enterprises need to strictly control the production process and obtain the recognition of consumers with high-quality products. The rational application of stoichiometry technology in the production process is the most economical and effective way to strengthen the quality management of enterprises and ensure the qualified product quality. Timely update and upgrade of stoichiometric related instruments and equipment, improve the accuracy of stoichiometry, improve the scientific and standardized product quality management, can effectively improve the product quality, so that enterprises can occupy a larger market, obtain more economic benefits and better brand image.

3.1. Ensure Product Quality to Meet Consumer Needs.

The stoichiometry of products in strict accordance with the standards can directly reflect the quality of products and the production level of the enterprise. The application of stoichiometry technology can not only digitally show whether the quality of the product is up to standard, but also can help consumers understand the real situation of the product to a certain extent. In the production process, enterprises should carry out stoichiometry according to the standards, carefully check the quality of products, to ensure that the quality of products is effectively improved to meet the needs of consumers, which plays a positive role in driving the long-term development, and can better improve the market position of enterprises. Stoichiometric technology can realize the visual supervision of product quality, cultivate the standardized product quality awareness, and maximize the product quality and safety[2]. In the stoichiometric work, it is necessary to clarify the testing objectives of each type of products, conduct scientific analysis, select reasonable testing technology and appropriate testing tools, and analyze and compare the parameter data and standard range, so as to master the quality of the actual production of products.

3.2. Ensure that the Product Quality Meets the Standards and Specifications.

Enterprises are the main body of production products. On the one hand, stoichiometry mainly tests the quality of products; on the other hand, the data results of stoichiometry can also be used to evaluate the production status of enterprises. Therefore, enterprises should attach great importance to stoichiometry and realize the benign supervision of stoichiometry to the production process. The Metrology Law and its implementation rules are the standard basis for carrying out the stoichiometry work. The stoichiometry of the products should be carried out in accordance with the provisions to further improve the quality of the products and ensure that the products meet the standards and specifications.

3.3. Provide Technical Support for the Production Process

Product quality is related to the foundation and lifeblood of the long-term development of an enterprise. Stoichiometry can scientifically evaluate the product quality through visual result data, ensure the product quality on the basis of minimizing production costs, and better promote the long-term development of an enterprise. All processes in the production of a product need to be strictly controlled by stoichiometry. In the process of stoichiometric operation, there are strict normative standards to ensure the accuracy of the test results, timely adjust the parameters of each link according to the actual situation, to ensure that the production process has based to follow, and better ensure that all performance indicators of the product are within the design scope[3]. In the production process, the use of stoichiometric technology, can accurately record the measurement data, through the visual stoichiometric data, for the subsequent production and operation of enterprises to provide reliable technical support.

3.4. Scientific Guidance of Product Production Activities.

If a new process is introduced in the production process of the enterprise products, stoichiometric measures are taken accordingly in the production process, and all parameters of the new equipment are adjusted accordingly to ensure that the quality of the products produced meets the standards and specifications. Combining the stoichiometric standards with the current production standards can effectively improve the scientific and professional production process. Under the guidance of stoichiometric technology, enterprises can scientifically adjust the relevant parameters of instruments and equipment, so as to reliably ensure the quality of products.

4. Uncertainty Analysis of the Stoichiometric Results

Stoichiometry requires the use of high-precision measuring instruments, usually used to measure the components of the sample, so it is necessary to track and analyze some chemical

reaction processes while ensuring the accuracy and effectiveness of the measurement, in order to effectively detect product quality. With the continuous progress of science and technology, people's requirements for product quality are getting higher and higher, which means that modern enterprises must improve the standard of product quality testing in the production link of products. In order to ensure the accuracy of the test results, the stoichiometric standards related to the product quality testing should be improved, so as to effectively avoid or reduce the uncertainty generated in the test, and reduce the impact as much as possible. Through analyzing the actual situation of the current stoichiometry, the author finds that the uncertainty of the stoichiometric results is still easy to appear, and the main reasons are as follows.

4.1. Preparation and Use of the Standards.

Because the characteristic value of the material contained in the standard is relatively uniform, it can be regarded as the quantitative value standard. In the preparation process of the standards, the possible deviation in calculating the sample values should also be taken into account. Once such deviations appear, there will certainly be uncertainty in stoichiometric results, which will affect the measurement and detection of subsequent links. Stoichiometry requires the use of suitable measuring instruments and equipment, whose accuracy and sensitivity must be guaranteed. Studies show that measuring instruments and equipment is the main cause of the uncertainty of stoichiometric results, and the uncertainty of stoichiometric results is closely related to measuring instruments and equipment. If the metering instrument is not accurate or not calibrated before measurement, the stoichiometry results will likely not be accurate.

4.2. Measuring Instruments and Equipment.

In the stoichiometry, a lot of equipment is used for physical and chemical testing and analysis. If the calibration and verification of the instrument and equipment are not done well in advance, the result data of stoichiometry will be affected and the uncertainty of stoichiometric results will be generated. Therefore, measuring instruments and equipment is also an important reason for the uncertainty of stoichiometric results. After a certain period of use, the accuracy of the instrument may be affected. The inspection of instruments and equipment is not timely or improper storage and management may also affect their accuracy. Before each use, measuring instruments and equipment should be thoroughly checked and calibrated to avoid uncertainty in the results caused by insufficient accuracy of instruments and equipment. At present, some relevant management personnel in the laboratories do not pay enough attention to this, and often start the stoichiometry without carrying out the calibration of the instruments and equipment, leading to the uncertainty of the results and affecting the accuracy of the final measurement results.

4.3. Chemical Metering Personnel.

When conducting the chemical measurement, when the stoichiometric personnel operation is inappropriate or unreasonable, it will also lead to the emergence of uncertainty in the result, which will affect the final stoichiometric results. For example, a stoichiometry worker who accidentally exposes the probe to the beaker wall during the experiment may cause a final reading error. Usually, these problems will lead to uncertain stoichiometric results, which will seriously affect the reliability of the experiment. For another example, when calibrating the dissolved oxygen analyzer, if the stoichiometric personnel can not reasonably control the measurement time, or the setting of the measurement point appears deviation, it will seriously affect the stoichiometric results.

5. Application Strategy of Stoichiometric Technology in Quality Management

The stoichiometry often causes outcome uncertainty due to the combined influence of many factors. Various strategies can be adopted to minimize the uncertainty of the stoichiometric results.

5.1. Attach Importance to the Management and Maintenance of Chemometric Instruments.

The accuracy of stoichiometric data largely depends largely on the quality and performance status of the stoichiometric equipment. Stoichiometric personnel must conduct the testing in strict accordance with the relevant operating procedures, and shall not have any deviation[4] during the whole process to ensure the accuracy of the test data. In addition, in order to improve the data accuracy, the metrology personnel can also increase the amount of detection, so as to avoid the data test instability due to the practical operation error. In practical work, the product quality inspection results are not accurate due to insufficient accuracy of stoichiometric instruments. Therefore, when the measurement personnel find that there are unreliable data results or large errors in the chemical measuring instruments and equipment, they should immediately make records and report to the relevant departments, notify the professional and technical personnel to timely calibration adjustment, ensure the accuracy of the chemical measuring instruments and equipment, and improve the accuracy of the detection data. At the same time, the relevant personnel should attach great importance to the management and maintenance work, do a good job in maintenance, and maintain the good performance of measuring instruments and equipment. Through the efficient management and maintenance of measuring instruments and equipment, to ensure that its performance is always in the best state, can play a due role in the product quality testing.

5.2. Record the Raw Data of the Measurement Results in Time.

Each stoichiometry must have a complete original record of the measurement results, which is the direct embodiment of the measured value in the process of product quality inspection, and also the inevitable requirement of product quality inspection. The accuracy, completeness and authenticity of the original data records directly affect the safety, reliability and effectiveness of the product quality. Therefore, after completing all the stoichiometry operations, it is necessary to directly process these data in a manual way to identify whether the relevant data is within the normal range and whether the error is too large. The final test report can be submitted only on the premise that the original records of the measurement results meet the requirements.

5.3. Enhance the Awareness of Personnel Measurement, Improve Their Technical Quality.

Reasonable operation and standard use of stoichiometric instruments is an important guarantee for accurate measurement results and numerical unity. The professional theoretical knowledge, professional skill level and professional ethics of stoichiometric personnel directly affect their measurement awareness and technical accomplishment. Only by constantly enriching professional theoretical knowledge, improving professional skills, and strengthening the training of professional ethics, can we skillfully use measuring instruments and equipment, enhance the measurement awareness and technical literacy, and finally improve the overall level of the technical team, and provide the most basic measurement guarantee for product quality. Therefore, relevant personnel should attach great importance to it, constantly enrich and expand their business knowledge and professional skills, and enhance their sense of professional responsibility. Enterprises should strengthen the quality management work, implement the quality management responsibility system, and closely link the economic benefits of relevant personnel with the quality management work [5].

6. Summary

In view of the increasingly wide application of stoichiometry in quality management and its profound impact on quality management, it is necessary to actively improve the stoichiometric system, build a standardized inspection system, and try to eliminate the uncertainty generated in the stoichiometry. In order to ensure the accuracy of the measurement results, the single measurement results should not be taken as the final test conclusion, but the results of multiple measurements should be considered comprehensively. At the same time, because the measurement awareness and technical literacy of the stoichiometric personnel themselves directly affect the measurement results, so the relevant personnel also need to constantly improve their own professional and business ability.

Stoichiometry is the foundation of quality management work, which provides technical support for product production, effectively guides product production, and effectively guarantees product quality. Enterprises should attach great importance to the stoichiometry work, ensure that the product quality is effectively improved under the promotion of stoichiometry, ensure that the stoichiometric technology is reasonably applied in practical work, improve the accuracy of test results, and effectively improve the efficiency of quality management.

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