Heft 70

Zur Empfindlichkeit der Methode der Kupferchloridkristallisation
Christine Ballivet, Haijo Knijpenga, Jean-Georges Barth, Raymond Clad

The Copper chloride crystallisation in the presence of added substances is a sensitive process. The significance of its results in the different fields of application (research on food quality and medicine, for example), is often questioned because of poor reproducibility. The question has thus arisen as to the significance of the experimental conditions for the pattern of crystallisation. In this article, this question is discussed for some experimental parameters at a given temperature. It determines the concentration – and interfacial surface tension gradients in the solution. But the latter are limited by the sort and quantity of the added substances and the interaction of the solution with the crystallisation plates and rings. Furthermore, the influence of the cleansing procedure on this interaction is shown. This influence in its turn is dependent on the duration of evaporation and on the nature of air movement. Thus the influence of one factor can change the influence of the other. This labile situation underlies the sensitive crystallisation process. In order to permit the specific influence of the added substance to express itself optimally, the corresponding conditions have to be found. But this optimum is not an absolute one. It is dependent on what question is being asked and of the nature of the addition.

Die Kristallisation von Kupferchlorid im Beisein eines Lösungsgenossen ist ein von vielen Faktoren abhängiger empfindlicher Prozess, was die Reproduzierbarkeit der Ergebnisse beeinflusst. Die hier vorgestellten Arbeiten gehen auf verschiedene Aspekte der Versuchsbedingungen ein. Ziel ist die Identifizierung wesentlicher Parameter, um die Versuchsbedingungen herauszuarbeiten, die zur Verbesserung der experimentellen Reproduzierbarkeit und diagnostischen Aussagekraft beitragen.

Die Gleichnissprache der Mathematik
Gerhard Kowol

In modern science the opinion predominates that the sensible reality can be explained by means of smallest components (elementary particles, genes). Goethe’s view is quite opposite. He says that the simple and imperfect elements can only be understood by looking at the composed and perfect objects. But the stupendous results of modern science make it difficult to argue in his direction. An analogous problem can be found within mathematics, if one looks at the axiomatics of Euclidean geometry. Up to the end of the last century, the basic elements always have been points, lines and planes, but in modern times these have been reduced to points alone. Since the mathematical theory itself does not differ in any way, it seems that the second view is preferable according to the minimum principle. But if one takes a superior point of view, which in this case means to pass over to projective geometry, it becomes clear that this opinion is wrong.

Science as process or dogma? The case of the Peppered Moth
Craig Holdrege

The example of the Peppered Moth (*Biston betularia*) is widely viewed and presented as a clear proof of evolution through natural selection. A study of the primary literature reveals a much more complex picture of the phenomena and of the process of scientific investigation.

This example can teach us to be critical of ‘scientific proofs’ and help us to view science as a process of interaction between the observer and the observed. This has significant implications for science education.

Industrie-Melanismus und Birkenspanner (*Biston betularia*) gelten im Allgemeinen als unumstößlicher Beweis dafür, dass natürliche Selektion die Evolution der Organismen steuert. Eine kritische Untersuchung der Primärliteratur zum Thema zeigt jedoch ein viel komplexeres Bild von den Phänomenen und Prozessen wissenschaftlicher Untersuchung.
Das Beispiel des Birkenspanners lehrt, so genannten wissenschaftlichen Beweisen gegenüber kritisch zu bleiben, und es hilft, Wissenschaft als Interaktion zwischen einem Beobachter und seinem Untersuchungsgegenstand zu verstehen. Diese Einsicht hat bedeutende Folgen für den wissenschaftlichen Unterricht an Schulen und Universitäten.