PROFILES IBSE Teaching/Learning Materials for Teachers

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KieWi & Co. – Substances in Everyday Life – "Where do the fizzy bubbles 'in' fizzy tablets come from?"

A Module for Science Instruction – especially Chemistry – for Grades 5 to 7

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Module Content

At the beginning of this sequence, a fizzy tablet is dropped into a glass of water and the children are asked to describe their observations. This everyday procedure is usually not registered consciously or questioned by the children. The specific situation in the course, however, makes the children aware of a new perspective. Although dissolving a fizzy tablet in water is something almost all children have seen before, they formulate their observations with a certain degree of astonishment and with full dedication. They ask the question, amongst others, "What is it that actually fizzes?" The children voice assumptions and begin suggesting solutions. They propose reading what it says on the packaging. This does not help them reach their goal, though, as the ingredients list does not describe the function of the substance. So the children guess which substance might cause the bubbles. Unhappy with this rather unclear situation, they ask if they could add the ingredients to the water separately and "look" which of the substances fizzes. But this does not lead to the desired result either, since the effervescence is only produced when mixing sodium hydrogen carbonate and citric acid in water.

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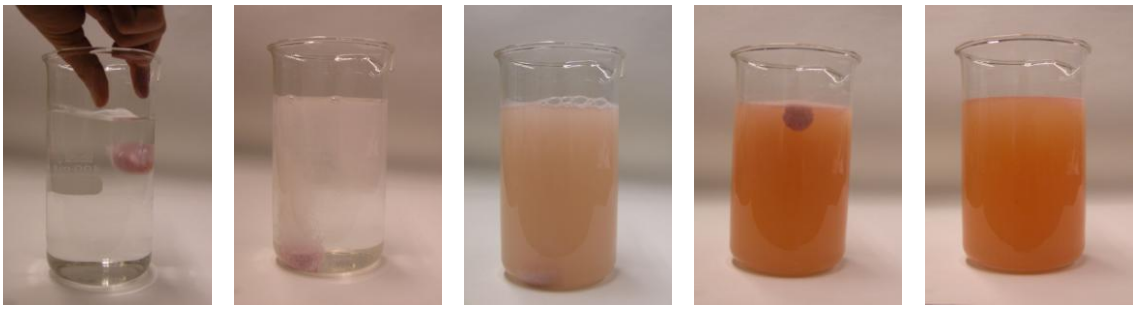
Therefore, the children have to test combinations of ingredients to get the 'fizzy bubbles' and to answer the question.



Picture 1 – Dissolving a Fizzy Tablet

Having answered the question in the course of the experiment, a further question follows: How much gas is produced from one tablet? The analysis of the problem gives the children further possibilities to develop their own ideas and suggestions for a solution. Studying the amount of gas produced, the children realise that tablets from different manufacturers produce different amounts of gas. This finding allows for a group discussion about the experimental setup, possible sources of error and once again about the composition of fizzy tablets.

In this sequence, then, the children independently plan experiments and test their suggestions for a solution. In the KieWi-courses it is not of importance that the children draw up a list of materials required or that they describe the experimental procedure in great detail. What is of importance is that they are encouraged to think about how they would – in principle – plan experiments; that is to say, how they would reflect on and systematically prepare and try out different options.

By starting with a question based on the observed phenomenon, the children go on to formulate assumptions and then verify them experimentally. Afterwards they reflect on and present the results. By doing so, the children are able to learn and practice the methods of thinking and working in science based on everyday problems that can turn out to be quite complex.

References

Streller, Sabine – Bolte, Claus (im Druck): Förderung des Interesses von Kindern an Naturwissenschaften. Erscheint in: Wiesemann, J. und Cech, D. (2007; Hg.): Kind und Wissenschaft – Welches Wissenschaftsverständnis hat der Sachunterricht? Probleme und Perspektiven des Sachunterrichts. Band 18. Bad Heilbrunn: Klinkhardt-Verlag.

Bolte, Claus – Streller, Sabine – Benedict, Claudia (2007): KieWi & Co.: Kinder im Grundschulalter entdecken (Natur-)Wissenschaften. In: Lauterbach, R., Hartinger, A., Feige, B. und Cech, D. (2007; Hg.): Kompetenzerwerb im Sachunterricht fördern und erfassen. Probleme und Perspektiven des Sachunterrichts. Band 17. Bad Heilbrunn: Klinkhardt-Verlag. S. 183-194.

Streller, Sabine – Bolte, Claus (2007): KieWi & Co.: “Einmal ist keinmal!“. In: Höttecke, D. (2007; Hg.): Naturwissenschaftlicher Unterricht im internationalen Vergleich. Zur Didaktik der Physik und Chemie. Probleme und Perspektiven. Münster: Lit-Verlag. S. 227-229.

Bolte, Claus – Benedict, Claudia – Streller, Sabine (2007): Wie Grundschulkinder Natur-Wissen schaffen (wollen). In: Höttecke, D. (2007; Hg.): Naturwissenschaftlicher Unterricht im internationalen Vergleich. Zur Didaktik der Physik und Chemie. Probleme und Perspektiven. Münster: Lit-Verlag. S. 548-550.

Bolte, Claus – Streller, Sabine (2006): KieWi & Co. – Chemiebezogene Bildungsangebote für Grundschulkinder und Grundschullehrkräfte. In: Nentwig, P. und Schanze, S. (2006; Hg.): Es ist nie zu früh! Naturwissenschaftliche Bildung in jungen Jahren. Münster: Waxmann-Verlag. S. 67-83.

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