

THE DISCOVERY OF THE PHOSPHORUS

In 1902 Herman Peters, a famous German historian of chemistry and pharmacy, made a thorough study of the autograph letters of Brand, Krafft, Kunckel, Homberg, G. W. Leibniz, and others which are preserved in the Royal Library at Hanover, and found that, although the various accounts differ in many respects, they all agree on one point: namely, that the original discoverer of elemental phosphorus was the seventeenth-century alchemist and physician Hennig (or Henning) Brand of Hamburg. Gottfried Wilhelm Leibniz (1646–1716) was personally acquainted with Brand, corresponded with him regularly for a last four years, and wrote a history of the discovery of phosphorus.

When Brand's alchemical experiments revealed the beautiful light-giving element, Brand called it cold fire («kaltes Feuer»), or, affectionately, «mein Feuer». The luminous substance which Kunckel subsequently exhibited in Hamburg was «Balduin's phosphorus», a phosphorescent calcium nitrate which had been prepared by distilling a solution of chalk in nitric acid. Brand's «cold fire» interested Kunckel greatly, and when he wrote about it to his friend, Johann Daniel Krafft (or Kraft) of Dresden, the latter also came to Hamburg. They visited Brand and suggested that they might be able to sell his secret to some royal personage for a high price.

In an attempt to sell the secret process, he exhibited the cold fire in the court of the Great Elector, Friedrich Wilhelm of Brandenburg. On April 24, 1676, at nine in the evening, all the candles were extinguished while Dr/ Krafft performed before a large assembly a number of experiments with the «perpetual fire». However, he did not reveal the method by which it had been prepared.

In the following spring Dr. Krafft went to the court at Hanover, where G. W. Leibniz was serving as librarian and historian under Duke Johann Friedrich, and exhibited two little phials that shone like glowworms. When Leibniz suggested that a large piece of phosphorus might give enough light to illumine an entire room, Dr. Krafft told him that this would be impractical because the process of preparation was too difficult. On September 15, 1677, Krafft performed some startling experiments with it before Robert Boyle and several other members of the Royal Society. At the request of Robert Hooke, Boyle wrote a detailed report of them. After the candles had been removed to another room

and «the windows closed with wooden-shuts», Krafft's precious little specimen of phosphorus, of the size of two peas, was seen to shine brightly. When Krafft scattered tiny bits of it on the carpet, Boyle was delighted «to see how vividly they shined... And these twinkling sparks, without doing any harm (that we took notice of) to the Turkey Carpet they lay on, continued to shine for a good while...Mr. Kraft also calling for a sheet of Paper and taking some his stuff upon the tip of his finger, writ in large characters... DOMINI,... which... shone so briskly and lookt so oddly, that the sight was extremely pleasing, having in it a mixture of strangnees, beauty, and frightfulness ...». One hundred and fifty-seven letters from Krafft are still preserved in the library at Hanover.

In 1726 W. Derham published a book entitled «Philosophical experiments and observations of the late eminent Dr. Robert Hooke, F. R.S. and Geom. Prof. Grech and other eminent Virtuoso's in his time» in which he included a detailed description of Brand's process of making phosphorus. Under the title «Phosphoros Elementaris, by Dr. Brandt of Hauburgh», Derham wrote: «Take a Quantity of Urine (not less for one Experiment than 50 or 60 Pails full); let it be steeping in one or more Tubs ... till it putrify and breed Worms, as it will do in 14 or 15 Days. Then, in a large Kettle, set some of it to boil on a strong Fire, and, as it consumes and evaporates, pour in more, and so on, till, at last, the whole Quantity be reduced to a Paste... and this may be done in two or three Days, if the Fire be well tended, but else it may be doing a Fortnight or more. Then take the said Paste, or Coal; powder it, and add thereto some fair Water, about 15 Fingers high...; and boil them together for 1/4 of an Hour. Then strain the Liquor and all through a Woollen Cloth...the Liquor that passes must be taken and boil'd till it come to a Salt, which it will be in a few Hours. Then take off the Caput Mortuum (which you have at any Apothecary's, being the Remainder of Aqua Fortis from Vitriol and Salt of Niter) and add a Pound thereof to half a Pound of the said Salt, both of them being first finely pulverized. And then for 24 Hours steep'd in the most rectify'd Spirit of Wine, two or three Fingers high, so as it will become a Kind of Pap.

Then evaporate all in warm Sand, and there will remain a red, or reddish, Salt. Take this Salt, put it into a Retort, and, for the first Hour, begin with a small Fire; more the next, a greater the 3d, and more the 4th; and then continue it, as high as you can, for 24 Hours. Sometimes, by the Force of the Fire, 24 Hours proves enough; for when you see the Recipient white and shining with the Fire, and that there are no more Flashes, or, as it were, Blasts of Wind, com-

ing from Time to Time from the Retort, then the Work is finished. And you may, with Feather, gather the Fire together, or scrape it off with a Knife, where it sticks».

And such, in a nutshell, was the history of phosphorus discovery.

К. А. Федулова

INFORMATION AND TECHNOLOGICAL COMPETENCE OF A FUTURE TECHNICIAN (PROGRAMMER)

In the recent decade in Russia there have been serious changes in evaluating such concepts as «competence» and «skills». It may be explained by severe requirements of the employers and the demand on the labor market which needs in competent specialists who are able to perform efficiently under new dynamic social and economic conditions.

This approach is accepted in most developed countries and is directly connected with a transition period (i.e. transition to the system of skills).

The notion of «competence» in the dictionary is defined as «having the knowledge that lets you judge about something». This notion, according to I. A. Zimnyaya, includes not only cognitive but also motivating, ethical, social and behavioral components. A skill is a category, belonging to the sphere of the relations between knowledge and practical activity of a person.

Having analyzed the opinions of scientists (J. Raven, E. F. Zeer, I. A. Zimney, A. K. Markova, V. V. Serikov and others) we consider a skill to be a subjective feature of a personality, allowing people to go their own ways. A skill is included in competence.

We define skills as requirements to a person which are reflected in his (or her) readiness to use the acquired knowledge in real life for solving different problems.

Looking into the matter of professional competence A. K. Markova defines its features: 1) competence is not the level of education only; 2) competence is a combination of personal qualities allowing people to go their own ways; 3) a person's activity shows his (or her) competence; 4) competence is a feature of a separate person and reveals itself in the result of his (or her) activity.

Thus, professional competence can be defined as a feature allowing people to go their own ways, ability and skills necessary to perform certain labor functions, estimating the results of their performance.