

SCIENCE
FOR EVERYONE

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SILHOUETTES
OF
CHEMISTRY

MIR

D.N. Trifonov and L.G. Vlasov Silhouettes of Chemistry

Translated from the Russian
by David Sobolev
and Andrei Konyaev



Mir
Publishers
Moscow

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Занимательно о химии

Издательство «Молодая гвардия»

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by David Sobolev
and Andrei Konyaev



Mir
Publishers
Moscow

First published 1970
Second printing 1977
Second edition, 1987

На английском языке

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Instead of a Preface

Once upon a time there was a very wise and learned ruler in the East who wished to know all about the peoples that inhabited the Earth.

He summoned his viziers and commanded:

"Write me a history of all the nations in the world, and tell me how they lived before and how they live now, what they do, what wars they have fought and are waging now, and what trades and arts flourish in different countries."

And he gave them five years to do this.

The viziers bowed in silence. Then they called together the wisest of the wise men in the kingdom and announced their ruler's will to them. It is said this caused an unprecedented boom in the parchment industry.

Five years later the viziers reassembled at the palace.

"Your will is done, O great king! Look out of the window and you will see that which you have desired..."

The ruler rubbed his eyes in amazement. Before the palace stood a caravan of camels, so long that the end was lost beyond the horizon. Each camel carried two huge packs and in each pack were ten enormous volumes beautifully bound in Morocco.

"What is that?" asked the monarch.

"It is the history of the world," replied the viziers. "At your command the wisest of the wise have toiled at it incessantly for five years!"

"Would you make fun of me?" thundered the monarch. "I could not read a smallest part of what they have written by the end of my life! Let them write me a short history. But let it include all the important events."

And he gave them another year.

The year passed and again a caravan stood before the palace. It was now only ten camels long, each camel carrying two packs of ten volumes on its back.

The monarch was furious.

"Let them write only of the most important events that happened among all nations in all times. How long will that take?"

Then the wisest of all the wise men came forward and said:

"Tomorrow, my Lord, you will have what you desire!"

"Tomorrow?" echoed the ruler in surprise. "Very well. But if you are deceiving me you shall lose your head!"

...Hardly had the sun mounted the blue sky and the slumbering flowers opened in all their splendour, than the monarch had the wise man summoned.

The sage entered with a tiny sandal-wood box in his hands.

"You will find here, O great king, the most important events that ever happened in the history of all the peoples in all times," said the sage with a low bow.

The monarch opened the box. On a velvet cu-

shion lay a small slip of parchment with a single phrase written on it: "They were born, they lived, and they died."

So runs the old legend. And when we were asked to write an entertaining book about chemistry and were told that paper would be limited (meaning the size of the book, of course) we could not help remembering it. That meant we could only write about the most important things. But what are the most important things in chemistry?

"Chemistry is the science of substances and their transformations." (At the end of the book we shall return to this definition of chemistry.)

Can you blame us for recalling that scrap of parchment in the sandal-wood box?

We scratched our heads, and racked our brains and decided that everything in chemistry is important. One thing may seem more important to one person and less important to another. For instance, an inorganic chemist may consider inorganic chemistry the hub of the universe, but an organic chemist would be of quite the opposite opinion. There is no soothing uniformity of views on this point.

Civilization is the sum of numerous items, and one of the most important of them is chemistry.

Chemistry enables man to smelt metals from ores and minerals. Without chemistry modern metallurgy would be impossible.

Chemistry creates out of animal, vegetable and mineral materials some wonderful and surprising substances.

It does not simply copy nature or imitate it, but surpasses it in more and more different ways

year by year. Thousands and thousands of substances have been produced that are not found in nature but possess very important and useful properties of great utility for the life and work of man.

The list of chemistry's good deeds is practically inexhaustible.

Every aspect of life involves an immense number of chemical processes. It is impossible to understand the fundamentals of vital activities without knowledge of the laws of chemistry.

Chemistry has had its say in the evolution of man.

Chemistry feeds us, clothes us, shoes us, and gives us the things without which modern civilized society cannot function.

The first rockets have been fired into outer space. Chemistry provided the fuel for their engines and strong heat-resistant materials for their design.

Should anyone try to write everything about chemistry in all its innumerable aspects and in all its splendour, the paper resources of even a highly developed state would be threatened with exhaustion. Fortunately, the idea has not yet occurred to anyone.

The second edition of this book in Russian was published almost two decades ago. The Russian edition of the book was entitled "Entertaining Chemistry". This title was not just a product of the authors' fantasy. In the 1960's Molodaya Gvardia Publishers was compiling a series of popular science books in different fields of science called "Entertaining...". So we were not able to take the initiative in this matter... However,

were it up to us, we would have chosen a different title.

Strictly speaking, "entertaining" means the same as "amusing": a kind of "amusing" reading on chemistry, a series of "intriguing" stories....

But chemistry in itself is such a fascinating sphere of human knowledge that it is simply impossible to write about it in a dull, impassionate manner. The language used should be simple and understandable, particularly when one is writing for laymen. But too much "amusement" is likely to be irritating....

The main thing is what to tell about? Chemistry does not have any definite bounds, its horizons are constantly expanding. The authors, however, are compelled to keep within the limits dictated by the size of the book. So, to use the language of publishers' annotations, "the authors have endeavoured to touch upon the most important and interesting problems of chemistry", namely:

- the Periodic System of Elements;
- various types of chemical reactions;
- some interesting and important chemical compounds;
- research methods applied to chemistry;
- some practical achievements of this science.

Only minor additions and corrections were introduced into several subsequent editions of the book in foreign languages. Meanwhile, time has marched on. Many new chemical discoveries have been made which should be made known to the public.

We were fortunate enough to be given an oppor-

tunity to revise (with certain limits, of course) the present third edition in English.

In any case, we succeeded in having the book revised to a certain degree. Some of the old material was omitted and the necessary additions and corrections were made. Several new essays were added. Sometimes we even had to change the style of writing: in two decades the reader has become more sophisticated, more informed, more learned.

A much harder task was to give our book the appropriate title. We finally fixed our choice on "Silhouettes of Chemistry" to which there may be objections. But this, after all, is the right of the authors....

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