

**INTRODUCTION TO SCIENTIFIC
GERMAN: AIR, WATER, LIGHT,
AND HEAT. EIGHT LECTURES ON
EXPERIMENTAL CHEMISTRY**

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Introduction to Scientific German: Air, Water, Light, and Heat. Eight Lectures on Experimental Chemistry by Reinhart Blochmann

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REINHART BLOCHMANN

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INTRODUCTION
TO
SCIENTIFIC GERMAN

AIR, WATER, LIGHT, AND HEAT

EIGHT LECTURES ON EXPERIMENTAL CHEMISTRY

BY

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EDITED WITH NOTES AND VOCABULARY

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PREFACE

The first text in scientific German to be put into the hands of high school or college students should be one that is clear and concise in style as well as simple and elementary in subject-matter. It should be confined to those fundamental sciences, like physics and chemistry, a knowledge of whose nomenclature is necessary to every student who may intend to specialize in any science and to utilize the wealth of knowledge stored up in German scientific works. All of these conditions are admirably fulfilled by the *Introduction to Scientific German*. The eight chapters contain the subject-matter of a course of public lectures on *air, water, light and heat* delivered by Dr. Reinhart Blochmann, professor of chemistry at the University of Königsberg, before the Verein für fortbildende Vorträge zu Königsberg i. Pr. in 1895 and 1897. Upon the solicitation of B. G. Teubner, book publisher of Leipzig, the author put these lectures into literary form and published them in 1899 under the title: *Luft, Wasser, Licht und Wärme. Acht Vorträge aus dem Gebiete der Experimental-Chemie*, constituting volume five of the series *Aus Natur und Geisteswelt*. This book became so popular that within four years a second edition was necessary. This contained an additional lecture on *Flüssige Luft*, which has been omitted in the present text. The remaining lectures are here republished with a few minor changes and omissions. The table of atomic weights at the close has been changed to correspond with the *International Atomic Weights for 1905*.

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The editor desires to express his sincere thanks to the author Professor Blochmann and to the publisher B. G. Teubner of Leipzig for their kind permission to republish these excellent lectures.

F. W. M.

UNIVERSITY OF WISCONSIN,
January, 1906.

INTRODUCTION

SUGGESTIONS FOR THE STUDY OF SCIENTIFIC GERMAN

I. THE PARTICIPIAL CONSTRUCTION

A present or past participle used attributively (i.e. before a noun) with its preceding qualifiers (words or phrases limiting it or depending upon it) forms the so-called participial construction. As this constitutes one of the chief characteristics of style in scientific German and often presents great difficulties to the student, a brief method for mastering it is given.

The student should first translate the passage literally, explain all constructions involved, remembering that participles used attributively are declined like adjectives; then he should give a free translation, using either of two ways: an English participial phrase or a relative clause. In long and involved passages the latter is preferable. Both renderings should be given in each case until the student is thoroughly familiar with them. The student will notice that in German the participle *precedes* by its qualifiers *precedes* the noun it limits, whereas in English the participle *succeeds* by its qualifiers *succeeds* the noun it limits. In all translation the fundamental principle must constantly be kept in view: *An intelligent free translation depends upon and must grow out of an accurate literal translation.* In accordance with these general suggestions a few typical

participial constructions are analyzed. For convenience of study these may be divided into four classes:

1. The participial construction consists of: (*a*) qualifier of the participle, (*b*) participle, (*c*) noun. The order of translation is *c, b, a*.

1. 11. **Aus vielen Beobachtungen gewonnene Erfahrungen wurden zusammengefaßt**, *from many observations gained, experiences were gathered together*; *gewonnene* is the past participle of *gewinnen* (er gewinnt, er gewann, er hat gewonnen), strong declension, nom. plu., qualified by *Aus vielen Beobachtungen*; *Beobachtungen*, dat. plu., governed by the prep. *aus*. Freely: *Facts gained from many observations*, or *Facts which were gained from many observations, were systematised*. Declension: nom. sing., *gewonnene Erfahrung*, etc.

2. The participial construction consists of: (*a*) determinative word (article, *dieser*-word or *kein*-word), (*b*) qualifiers of the participle, (*c*) participle, (*d*) noun. The order of translation is *a, d, c, b*.

3. 26. **in der seiner Form entsprechenden Weise**, *in the, its form corresponding, manner*; *entsprechenden* is the present participle of *entsprechen* (er entspricht, er entsprach, er hat entsprochen), weak declension, dat. sing. fem., governed by the preposition *in*; qualified by *seiner Form*, dat. sing. fem., governed by *entsprechenden*. Freely: *in the manner corresponding to its form*, or *which corresponds to its form*. Declension: nom. sing., *die (seiner Form) entsprechende Weise*, etc.

3. The participial construction consists of: (*a*) determinative word, (*b*) qualifiers of the participle, (*c*) participle, (*d*) one or more adjectives, (*e*), noun. The order of translation is *a, d, e, c, b*.

77. 25. **daß aus dem Kalium beim Überleiten von Kohlenäure entstandenen weißen Körpers**, *of the, from the potassium by the passing over of carbon dioxide formed, white body*; *entstandenen* is the past participle of *entstehen* (er entsteht, er entstand, er ist entstanden), weak declension, gen. sing. mas., qualified by *aus dem Kalium beim Überleiten von Kohlenäure*. Freely: *of the white body formed from*

the potassium by the passing over of carbon dioxide, or which is formed from the potassium by the passing over of carbon dioxide.

Declension: nom. sing., der (aus dem Kalium beim Überleiten von Kohlenäure) entstandene weiße Körper, etc.

4. The participial construction consists of: (*a*) determinative word, (*b*) qualifier of the participle, (*c*) participle, (*d*) noun, (*e*) a modifier of the noun (usually a genitive). The order of translation is *a, d, e, c, b*.

27. 7. den nicht von der Flamme umspalten Teil des Gläschens A, *the, not by the flame surrounded, part of the small glass A.* Freely: *the part of the test-tube A not surrounded by the flame, or which is not surrounded by the flame.* Declension: nom. sing., der (nicht von der Flamme) umspaltete Teil des Gläschens A, etc.

II. ADJECTIVE CONSTRUCTIONS TRANSLATED LIKE PARTICIPIAL CONSTRUCTIONS

A construction which contains an adjective having a qualifier, or words depending upon or governed by it, should be treated like a participial construction.

3. 24. eine ihm eigentümliche Form, *a form peculiar to it.*

47. 25. einen im Vergleich zu dem Inhalt des Kessels verschwindend kleinen Raum, *a space exceedingly small in comparison with the contents of the boiler.*

III. WORD-COMPOSITION

Another important difference in style between scientific and literary German is in word-composition and vocabulary. The "long words" of scientific German, which are usually not found in the dictionary, present further difficulties to the student. The flexibility of the German language lends itself readily to the process of word-formation. The possibilities of combining pre-

fixes, suffixes, simple, derivative and compound forms with one another are practically infinite.

In the study of long compound words the method of dissection must again be applied. The meaning of the entire word should be secured through the component parts; first, analysis, then, synthesis.

Thus Petroleumkochapparate = Petroleum + kochen + Apparate, *apparatus for cooking with petroleum*; Verbrennungsvorgänge = Verbrennung + Vorgänge, *processes of combustion*; Regenerativ-Gaskaminöfen = Regenerativ + Gas + Kamin + Ofen, *regenerative gas chimney stoves, regenerative gas-grates*; Gleichgewichtslage = gleich + Gewicht + Lage, *equal weight position, equilibrium*.

IV. VOCABULARY

The vocabulary of every student is of two kinds: *active* and *potential*. His *active* vocabulary is composed of the words he actually knows, no matter where or in what relation they may occur. This is usually quite limited. His *potential* vocabulary consists of all those words which he once knew and would recognize again, or words which he would understand, if they occurred in a favorable relation. This is usually several times as large as his active vocabulary. Every lesson ought to add a small number of words to the student's active vocabulary and a still larger number to his potential vocabulary. In all elementary instruction in any foreign language it is therefore highly advisable to give some definite systematic work on the vocabulary. To this end the instructor should each day carefully select about ten or twelve of those new words in the next day's lesson which are apt to occur most frequently in succeeding lessons and assign these words to be studied and memorized until they become a part of the student's