A SYNOPSIS OF A COURSE OF LECTURES IN GENERAL CHEMISTRY PUT IN THE FORM OF QUESTIONS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649234714

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Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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Trieste

A SYNOPSIS

OF A COURSE OF LECTURES

IN

General Chemistry

PUT IN THE FORM OF QUESTIONS

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ANN ARBOR PLANT
THE RICHMOND & BACKUS CO.

PREFATORY NOTE.

The following questions constitute a synopsis of a course in general chemistry through the non-metals, and cover more than half of a lecture course planned to run through the year. A brief discussion of solutions and osmotic pressure, a study of carbon and of the metals completes the course.

As the majority of students take general chemistry soon after entering the university and before they have acquired proficiency in taking lecture notes, the purpose of the questions is mainly to indicate what is most characteristic, what should be noted and learned, about the substances investigated. Therefore these characteristic properties are, in most instances, asked for specifically. It will be noticed that the answers to some questions are contained in those immediately succeeding, but this is not thought to be a serious fault in a scheme intended primarily for directing a student's attention to what to study. If a student, shortly after a lecture, checks off in this pamphlet the points touched upon and, with the aid of his text, amplifies his own notes taken during the lecture, he will have a fair resumé of the subject. It is hoped that the sub-headings in heavy type will enable the student to find readily what he is looking for even though the order of presentation in the lecture is different, and some topics are omitted.

A second purpose which these questions are intended to serve is to aid the instructors in recitation work. Where classes are so large that they must be divided into sections which recite to different instructors, such a list of questions facilitates the indication of the ground which has been covered in the lectures and in each quiz section.

GENERAL CHEMISTRY

METHOD OF DESCRIPTION

When asked to describe a substance imagine that you have a sample of it before you and state all of its properties which you can determine by inspection. Next give the odor and taste, if these are at all characteristic or are generally used to aid in the identification of the substance. Then give the properties requiring instruments and manipulation for their determination, i. e., the physical-chemical constants (boiling point, freezing point, specific gravity), with reasonable accuracy if the substance is common or important and these constants fall within the range conveniently measured, otherwise an approximation or a relative statement such as that nitrogen boils at a somewhat lower temperature than oxygen will suffice. There should follow some statement of the solubility of the substance in water, and occasionally in other solvents as alcohol, ether and carbon bisulphide. The more strictly chemical properties are next to be considered. These are usually numerous and a selection should be made guided by the following rules: First, give some properties which bring out the analogy between the substance in hand and other, nearly related, substances. Second, give some properties characteristic of the substance as such, possessed by no other substance. Lastly mention some of the uses of the substance. Throughout the description be on the watch for, and call attention to, illustrations and applications of general and fundamental principles.

SOME FUNDAMENTAL CONCEPTS, UNITS AND LAWS

Define law, theory, hypothesis. Give examples.

Outline the correct method of thought.

What do we mean by a property of a substance. What do we mean by a substance. How many properties has one substance. Divide properties into two classes, essential and non-essential, for

the study of chemistry, and give several concrete examples of each.

How many properties must be considered in order to establish identity between two substances. State the law here involved.

What do we mean by a process. Divide processes into two classes in such a way as to bring out the difference between chemistry and physics. What is a chemical reaction.

Define energy. How many forms of energy are there. Give one convenient classification of known forms of energy.

State the law of conservation of energy. Describe several laboratory experiments illustrating this law. To whom do we owe it.

Define matter. Are we sure it exists. Arranging our knowledge according to its degree of certainty what comes first, what follows, where does matter fall in the sequence. What two properties are always obvious when we say matter is present.

(A thorough knowledge of the metric system of weights and measures is assumed.)

Define weight and mass, emphasizing the difference between them. Give several illustrations of the fact that weight and mass are not synonymous terms. What is the unit of mass. Explain the centimeter-gram-second system of measurements. What is a dyne, an erg.

Which phrase is preferable, the conservation of matter, or of mass. State this law. Describe several laboratory experiments and several phenomena of nature on a large scale illustrating this law. To whom do we owe it. To what degree of accuracy has this law been proven by laboratory methods.

Name and define the three conditions of aggregation of matter. What other condition of matter may well be included in the list and be called a fourth condition of aggregation.

WATER

Give some of the essential properties of water. Divide these into physical and chemical. Make the list complete enough to establish the identity of water.

Physical Constants.

What are the three physical constants most used in chemistry.