(*f*) Same as (*e*), except after the casein was added the mixture was allowed to digest for 24 hours at 36°.

(*g*) 25 cc. seed extract + 10 cc. ox serum, and the mixture allowed to stand for 15 hours, after which 50 cc. casein solution were added and this mixture titrated without time for digestion.

(*h*) Same as (*g*), except after the casein was added the mixture was digested for 24 hours at 36°.

Following are the results of the formol titrations:

(*a*) 2.08 cc., (*b*) 5.31 cc. (*b*) — (*a*) = 3.23 cc. 0.5 *N* NaOH.
(*c*) 2.93 cc., (*d*) 5.80 cc. (*d*) — (*c*) = 2.87 cc. 0.5 *N* NaOH.
(*e*) 3.09 cc., (*f*) 5.24 cc. (*f*) — (*e*) = 2.15 cc. 0.5 *N* NaOH.
(*g*) 3.74 cc., (*h*) 4.77 cc. (*h*) — (*g*) = 1.03 cc. 0.5 *N* NaOH.

From these values it is evident that ox serum, as well as egg albumin, inhibits the digestion of casein by the alfalfa seed protease.

Conclusions.

The above investigation establishes that the alfalfa seeds contain enzymes that have the power of hydrolyzing starch and amygdalin, like amylase and emulsin, respectively; an enzyme that coagulates milk, like rennin; an enzyme that precipitates purpurogallin from a pyrogallol solution with hydrogen peroxide, like the ordinary peroxidases; and an enzyme that has the power of digesting casein and Witte peptone, like a protease.

The investigation further established that this protease is a vegetable erepsin, for it will not begin the digestion of egg albumin, serum, legumin or conglutin; and that its digestion of casein and Witte peptone is inhibited to some extent by the presence of small quantities of egg albumin and serum.

The seeds, in all probability, do not contain invertase, and if a lipase is present, it is not soluble in water. It is not probable that the acidity developed in the seed extract, when allowed to stand, is due to a lipase, for the clear extract, having no solid present, also turns acid in the given time; and that this extract is unable to hydrolyze ethyl butyrate.

I am hoping to be able to carry out similar experiments with extracts from the roots, stems and leaves of the alfalfa plant.

NEW BOOKS.

Les Atmosphères des Planètes. By Dr. Svante Arrhenius. Address given before the Société de Chimie Physique, 8 March, 1911. A. Hermann et fils 6, Rue de la Sorbonne, 6, Paris. Price, 1 franc.

In order that a planet may be said to have an atmosphere, it must show a sharp discontinuity of density. Within the solar system this is certainly true of Mercury, Venus, the Earth and Mars. Accordingly, the prevailing atmospheric conditions upon these planets (and the Moon) are discussed, together with an outline of the steps through which each may have passed in reaching the present stage of its development. Physical data of various kinds form the basis of the reasoning throughout.

The Moon, for example, reflects but 13% (comparable with yellow sandstone) of the light of the Sun, compared with an average of over 50% for all the planets—which shows it to be free from clouds or dust, and therefore from any atmosphere, except perhaps certain of the heavier gases condensed about its colder portions. Furthermore, the temperature of the side toward the Sun reaches 150° with the Sun at the zenith, a temperature at which a considerable proportion of the molecules of the common atmospheric gases would be projected into space with a velocity so great that they could not return to the Moon.

The same conditions are found upon the planet Mercury—a reflecting power of 14%, practically identical with that of the Moon, and a temperature, with the Sun at the zenith, 1.7 greater. Venus, on the other hand, reflects 76% (comparable with snow) of the Sun's light, showing the presence of clouds in such quantity that sunlight probably never reaches the surface of the planet itself.

Most interesting just at this time are the author's deductions about the origin of the present atmosphere of the Earth, and about the atmosphere of Mars. The Earth is supposed originally to have had an outer atmosphere like the exterior portions of the Sun, or of the four outer planets—metal vapors, hydrogen, helium, hydrocarbons, cyanogen, and in smaller quantity free oxygen and nitrogen—also perhaps (like the Sun) silicates, sulphur, and phosphorus. As the temperature diminished, the metals and silicates condensed, leaving hydrogen, the hydrocarbons and cyanogen (a strongly reducing atmosphere) which combined with the primitive oxygen to form water and carbon dioxide (partly combined with the solidifying silicates) as soon as the temperature reached 1500°. Below this temperature, the cooling Earth possessed a true atmosphere.

These two gases (water and carbon dioxide) are known to be decomposed by plants into oxygen and organic matter eventually yielding coal. This chemical change being of catalytic character (through the action of sunlight and chlorophyll), it can be assumed upon theoretical grounds that the same reaction can proceed without the catalyzer if time enough be given. We are therefore justified in assuming that carbon dioxide separates into oxygen and carbon when exposed to the Sun's light in the absence of chlorophyll-bearing plants, and that this change, in geologic time, had opportunity to proceed nearly to completion. The oxygen thus produced served to purify the air of the reducing gases (through combination with the hydrogen, hydrocarbons, cyanogen, etc.) and to give us water vapor and free nitrogen, the water vapor condensing (beginning of the ocean) as soon as the temperature fell below 365°. The cooling crust continued to release (from crust and magma beneath) water and carbon dioxide and the oceans grew. Organic life first appeared at a temperature of about 60° and accelerated the separation of the oxygen and carbon, eventually establishing present conditions.

Continuing this reasoning, the author predicts the gradual exhaustion of the free carbon dioxide of the atmosphere and the disappearance of vegetation, resulting in a desert climate resembling that of the steppes and deserts. Rocks will crack and great areas become desiccated and reduced to sand and dust, which when mixed with occasional rain will form great basins of thick mud with cracked and sun-baked surfaces like the "khévirs" of Persia and Turkestan. The great khévir of Persia has an area of 55,000 square kilometers, comparable in size with Lake Michigan.

The author then supposes the planet Mars to have reached this condition already, and the so called canals to be merely great khévirs, which are dark or light in color according as the season is wet or dry, and which are regularly arranged only in so far as the contours of the Martian crust, which define these basins, chance to be symmetrically figured.

The reflecting power of Mars for the Sun's light is but 22%, that is, it is but slightly greater than that of the Moon or Mercury. Mars, therefore, possesses an atmosphere, but it is much less dense than that of the Earth. This is further established by the white patches of frost or snow which mark the polar regions of the planet in the winter season.

Finally, the author pictures our planet dead when the oxygen shall have been consumed by the rocks and only inert gases remain to condense gradually as the Sun's heat diminishes. The appearance of its surface will then resemble that of the Moon. ARTHUR L. DAY.

Contributions from the Sanitary Research Laboratory and Sewage Experiment Station. Massachusetts Institute of Technology. Vol. 8, Boston, Mass. Dept. of Biology and Public Health, Mass. Institute of Technology, 1912. Reprinted papers. Price, $1.00.

A collection of papers published by members of the staff of the Department of Biology and Public Health. The volume includes papers on illuminating gas, water, sewage, disinfectants, milk, ice, and housing conditions as related to health, also papers on the administration of public health work. EDWARD BARTOW.

A Brief Laboratory Guide for Qualitative Analysis. By ARTHUR E. HILL, Ph.D. Easton, Pa.: The Chemical Publishing Co., 1911. pp. vi+80. Price, $1.00.

This small laboratory guide is written for students who can give but six hours a week for one-half year to qualitative analysis.

It is intended to be sufficiently brief to enable such students to make complete analyses of a considerable number of substances.

The author has used it for six years and found that it has "justified its existence in that students who have completed the course, although they have not gained a very wide knowledge of qualitative methods and of alternative tests, are yet able to make correct and complete analyses of unknown substances of the nature of minerals and technical products of ordinary complexity."

In the text the hydrochloric acid group is omitted, silver, lead and mercury being detected in the hydrogen sulphide group. Cadmium and strontium are excluded as not being of sufficiently frequent occurrence in natural or commercial products. No provision is made for the analysis of substances containing phosphates and oxalates of the alkalin earth metals.

The laboratory directions are interspersed with frequent explanations of a theoretical nature and the course is intended to be accompanied by fifteen lectures, in which, no doubt, the theory is developed more fully.

The first three parts deal with solution of substances, analysis for metals and analysis for acids, respectively. In the last part the student is called upon to write chemical equations. EDWARD H. KEISER.

L'Arsenico nella Scienza, nell' Industria e negli Avvelenamenti. By LEONARDO MAURANTONIO, Dottore in Chimica. Milano, Ulrico Hoepli, 1912. pp. xii + 256. Price, 2.50 lire.

This elegantly printed little manual is one of the many coming from the important publishing house of Hoepli. The author proposed to write a simple account of arsenic, suited to the wants of students, manufacturers and analysts. Six chapters are given to the element and its inorganic compounds, and one describes its extraction from the minerals containing it. Three chapters contain the toxicology of arsenic and advice in case of poisoning by it, and a following very long chapter describes alloys containing arsenic which are used in the arts, and the arsenical preparations of pharmacy, together with the chemistry of organic compounds containing arsenic. Statistics as to the production of arsenic, and analytical methods relating to it, fill the two remaining chapters of the little book. It seems well adapted to the uses for which it was designed.

EDWARD W. MORLEY.

Reports of the Chemical Laboratory of the American Medical Association. Vol. 4. Jan.–Dec., 1911. By W. A. PUCKNER, Director of the Laboratory. Brochure, pp. 127. Press of the A. M. A., Chicago, Ill.

The writer of this brief notice has availed himself of every opportunity to call attention to the valuable work done by Mr. Puckner and his associates. Hence, after having taken cognizance of the contents of volume four of the "Reports," he can do neither more nor less than to reiterate his former statements. Not only is light thrown on many subjects and many a fake exposed, but the so called "legitimate" manufacturers are not spared. No doubt all of this is necessary to bring about the desired reforms. Having always commended the good done so far by Mr. Puckner and his staff, we take the liberty to suggest that one of these days the A. M. A. reveal the same "stiff backbone" in investigating the medicines dispensed by physicians. We have no doubt that, if such an investigation is undertaken and conducted with the same sincerity, some interesting results may be looked for. E. Kremers.

Researches on Cellulose, III. By C. F. Cross and E. J. Bevan. London: Longmans, Green & Co., 1905–1910. pp. 170, 8vo.

The volume reviews, in five chapters, the more recent publications in the cellulose field, supplemented by critical discussion. The first chapter is a review of the relation of cellulose to biological science. The second chapter is largely a very comprehensive and valuable discussion of normal cellulose. The third chapter considers the organic esters of cellulose and starch, reviewing particularly such investigations as seem to give some light on the constitution of cellulose.

The fourth chapter reviews the publications on ligno-celluloses, while the fifth chapter under the title of "Technical Developments" reviews some very interesting investigations on the effect of some of the constituents of raw cotton on its spinning quality and interesting information regarding bleaching troubles, developments in the production of films and artificial silks from viscose and a discussion of the value of cellulose acetate as a general substitute for celluloid, as well as an interesting review of the use of cellulose acetate as a wire insulator. H. S. Mork.