SCIENCE NEWS

Science Service, Washington, D. C.

THE CONCENTRATION OF RARE EARTHS BY ELECTROLYSIS

A NEW method for concentrating many of the so-called rare earth elements, whose purification has baffled chemistry for years, was presented to the meeting in New York City of the Electrochemical Society.

Professor B. S. Hopkins, of the department of chemistry of the University of Illinois, told of his new experiments with salts of the rare earths in collaboration with Dr. L. F. Audrieth. Professor Hopkins is famous for his discovery in 1926 of the element illinium, a metal with valuable properties.

The rare earths have atomic numbers from 57 to 71 in the periodic table of the chemical elements. They are seldom shown on the familiar classroom charts because they unduly complicate the classification of the elements in a systematic arrangement.

Minerals containing the rare earths occur chiefly in Scandinavia, the Urals, America, Brazil, India and Australia. Owing to the extraordinary chemical similarity of the members of the rare earths and to the further fact that they are associated in nature, it is very difficult to separate them and to prepare them in the pure state. Professor Hopkins's report to the society describes a new method for solving this problem, at least in part.

The first stage in the concentration of rare earth is to mix them with mercury for which they have a great affinity. Mercury amalgams of the rare elements are thus obtained. The preparation of mercury amalgams is not the easy process used by dentists in making silver amalgams for dental fillings. It is necessary to use electrochemical processes where the conducting solution is mercury chloride. Rare earth amalgams prepared electrochemically are liquid or pasty masses containing from one half to three per cent. of the rare earth metal by weight. The amalgams are easily decomposed by exposure to air and moisture. They must be preserved in a vacuum or in an inert atmosphere like neon, argon or helium. Dr. Hopkins states that the amalgams may serve as the starting point for the preparation of the corresponding rare earth metals.

THE INTERNATIONAL STEAM TABLE CONFERENCE

RESEARCH in pure science on the properties of steam is, at last, catching up with the advances made in the improvements in steam power plants and generating turbines. This situation is, in many ways, the exact reverse of the condition found elsewhere in science, where the popular cry is for a moratorium on research until the world catches up with scientific discovery.

With what success science is "catching up" was disclosed at the third International Steam Table Conference in session at the National Bureau of Standards. Investigators gathered in Washington from the United States, England and Germany planned to visit the Massachusetts Institute of Technology and New York City for the concluding sessions of the conference.

Steam tables are lengthy compilations of steam's properties expressed in columns of figures showing the variation of steam's temperature with pressure and countless other data. It is from steam tables that engineers compute estimates of temperatures and efficiencies of power generating units before a hand is turned to construct them. A great million-dollar steam power plant is built for maximum efficiency on the basis of steam tables.

From 1910 to 1930 the development of steam generators, super-heaters and turbines outstripped knowledge of the properties of steam. Steam engineering, in a word, was shooting in the dark and achieving results by the trial and error method.

In 1921 the American Society of Mechanical Engineers began the movement for more experimental work on steam's properties. At London in 1929, in Berlin in 1930 and now in the United States various investigators who have been collecting and extending the data on the properties of steam have gathered to report progress, coordinate data and discuss future research.

At the Bureau of Standards work has progressed on a study of the properties of saturated steam from the freezing point of water to 704 degrees Fahrenheit and from pressures of a fraction of a pound to 3,200 pounds to the square inch. The bureau's work is in excellent agreement with that done elsewhere.

This extensive research has brought into agreement the steam tables used throughout the world. It is now possible to build a turbine in one country and have it pass efficiency tests in another. Formerly the different steam tables in use often led to completely different results on the supposed efficiency of a steam power unit. One aim of the conference is to produce a steam table which will be agreed upon internationally.

A NEW STREET CAR

A NEW street car representing four years of research and a million dollars in cost was exhibited in Cleveland on September 24. The car is a street car rider's "dream" of the millennium. Every remedial annoyance incidental to transport by urban electric car has been removed from the new development.

Forced ventilation is supplied, the seats all face forward and are of the familiar motor bus type; deep, soft and upholstered at side and back in leather. The windows really move; not by two-handed brute force with the help of a crowbar, but like windows in automobiles. The first high step getting into the car has been replaced by stairs like those of the home. Wherever one stands in the car there is a handrail or grip so near that not even one step is necessary to reach it. Lighting is indirect and provides three times normal street car illumination without glare. Noise is diminished within the car by replacing steel coiled springs with rubber pads. The

wheels are resilient; a combination of steel and rubber so designed that they transmit less vibration and noise than formerly.

Construction of the car was in the hands of Professor C. F. Hirschfeld, chief of the research department of the Detroit Edison Company. He had had, however, no experience in designing street cars. Starting "from the ground up" his first thought was to talk with many street-car riders and find out all the things about this form of transport which they did not like. Afterward he went to the electric railway companies studying economical operation and finally to the manufacturers to have the many ideas worked out.

The new street car will accelerate about twice as rapidly as has been customary. Yet it can do this far more smoothly than do present street cars. Not only will this improved speeding up decrease the running time for a multi-stop route, but it is believed that it will reduce accidents at traffic stops. At present, it is explained, automobiles can accelerate faster than a street car from a standing start. As a result, drivers like to cut over to the car tracks in front of the car as both get under way. With faster acceleration in the new car, 10 per cent. more than that possible in automobiles, it is believed motor cars will be unable to cross over to the tracks because the street car will already be there.

Finding that rubber tires for street car wheels would not, in their present stage of development, stand the strain of service the development engineers have produced a resilient wheel made of steel parts interlocked with rubber. To reduce the transmission of vibration from the trucks up to the car body, rubber springs instead of steel springs are used.

AIR-CONDITIONING OF HOSPITALS

HOSPITALS will increase their patients' chances for recovery if they provide ideal weather in the hospital rooms and wards, in the opinion of Professor C. A. Mills, of the University of Cincinnati, given in a paper read before the American Hospital Association, meeting in Philadelphia. Professor Mills said that his six years' investigation of the effect of climate on health has convinced him that man derives his energy and vitality from the type of climate under which he lives. He pointed out that resistance to tuberculosis, colds, infections of childbirth, kidney diseases and appendicitis are affected by the weather. Moist heat that depresses body metabolism makes for an increased susceptibility to infection and lessened ability to fight bacterial invasions once they have gained a foothold. Of each 100 cases of acute appendicitis handled in hospitals the fatality rate is almost three times as high in the South as in the North, with a steady lowering of the fatality rate as one goes northward from the Gulf region. Close study of the facts indicates that this difference is not due to better hospital or medical handling of the cases in the North, but depends on a basic difference in the human resistance to infection. Acute nephritis shows a similar high death rate in the South and low death rate in the more stormy North.

Hospitals and sanatoriums in most parts of the country should be able to protect their patients from the heat waves of the summer, and tuberculosis sanatoriums in particular should be able to protect their patients the year around from sudden changes in weather. In addition to such air-conditioning, Dr. Mills believes that it would be well to have part of the hospital constructed so that positive atmospheric pressure is available for patients who might be benefitted by it.

Providing ideal weather in old hospital buildings would be exceedingly costly because of the lack of insulation. Professor Mills therefore recommends that special attention be given to insulation of new hospital buildings so that they can be equipped with air-conditioning later if such equipment can not be installed in the first place.

ITEMS

RIGIDLY gripped in the ice of a glacial age such as the earth has never known, the giant outer planets, Jupiter, Saturn, Uranus and Neptune may be rolling forever through space as enormous ice-covered balls. This suggestion is made by Professor R. Wildt, of the University of Göttingen, in a communication to *Nature*. Professor Wildt has taken the known masses of the great planets, and by mathematically parcelling-out has constructed hypothetical models of them that are in accordance with the widely accepted geochemical ideas of Professor H. Jeffreys. At the same time, he says, his theory accounts for the low average densities of the planets which have caused so much difficulty to astronomers. As pictured by Professor Wildt, each of the four giant outer planets has an internal core with a density or specific gravity of 5.5, similar in general to our "home" planet, the earth. Over that is a thick or never-thawing ice. Finally, there is a deep outer envelope of gaseous atmosphere, largely hydrogen, though containing also the great quantities of ammonia and methane lately detected in the planetary atmospheres by Drs. A. Adel and V. M. Slipher.

THAT popular old method of treating a sore throat, gargling, has been subjected to scientific scrutiny and found wanting. "Gargling is ineffective and should be replaced by the gravity irrigation method," according to Drs. William Snow and J. E. Stern, of New York City, in a report made to the American Medical Association. Their conclusion was based on tests in which subjects gargled with a thin liquid suspension of barium while x-ray pictures of the head and neck were made. The subjects tried violent gargling, gentle gargling and tilting the head backward and letting the liquid run as far back as possible without gargling. The x-ray pictures showed that will all these methods the tongue is firmly pressed against the soft palate in such a way that the liquid can not reach the throat. Gravity irrigations with the head and neck bent, such as many physicians use in treating the throat, were found to be successful in getting the liquid back into the throat.

MOTION pictures of a huge "bomb" about 25,000 miles long that shot out from a sun-spot on June 19 and

then exploded above the solar surface were shown to members of the American Astronomical Society, meeting at Connecticut College. The films were made by Robert R. McMath and R. M. Petrie, at the McMath-Hulbert Observatory of the University of Michigan. This is an observatory established by a group of non-professional astronomers especially for taking astronomical motion pictures. The pictures displayed were the first results shown of the work of the "spectrohelio-cinematograph," an attachment for the telescope which permits motion pictures to be made of the sun in the light of a single wave-length. When projected at the usual rate the motion is speeded up about 450 times. Thus changes that would take many hours to observe while watching the sun can be shown in a few minutes.

CHILDREN under school age are more in danger of death from accidents than those who have started their school work, according to statisticians of the Metropolitan Life Insurance Company. Fatal accidents are almost twice as numerous among children under five as among those between the ages of five and fifteen years. Accidents kill more small children than measles, diphtheria and scarlet fever combined. Burns, automobile accidents, mechanical suffocation, drownings, falls and poisonings account for almost three fourths of accidental deaths among children under five. Burns and scalds alone account for a quarter of these deaths. One encouraging feature of the situation is that the accident death rate for this group of children has declined 20 per cent. in the last ten years.

LOBAR pneumonia is being treated with encouraging results by a method originally devised for the treatment of tuberculosis of the lungs, according to a report by Dr. Francis G. Blake, of Yale University Medical School, at the meeting in New Haven of the Connecticut Clinical Congress. The method, known as artificial pneumothorax, consists in putting the affected lung to rest by decompressing or collapsing it. In tuberculosis this promotes healing and prevents extension of the disease. Experience with a large series of cases at the New Haven Hospital showed that the mortality rate from lobar pneumonia can be greatly reduced by this method of treatment. The lung must be collapsed on or before the third day of the disease. If no adhesions are present from previous pleurisy, the treatment causes a dramatic drop in temperature and relief from pain.

IS America getting wider across the middle or has some slight error crept into either the measuring methods of the astronomers or their arithmetic? Whatever may be the case, the distance between Washington, D. C., and San Diego, Calif., showed an apparent increase of about forty feet in 1933 as compared with measurements made seven years earlier. This discrepancy was reported at the meeting of the American Astronomical Society at Connecticut College by C. B. Watts of the U. S. Naval Observatory. Mr. Watts added, however, that he inclined to the second alternative; it appears easier for astronomers to make an error of forty feet in measuring a line 3,000 miles long than for the United States to grow forty feet "fatter" in seven years.