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The

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CHEMIST

BULLETIN OF THE PUGET SOUND SECTION OF THE AMERICAN CHEMICAL SOCIETY

MARCH, 1952



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Published by the Puget Sound Section of the American Chemical Society

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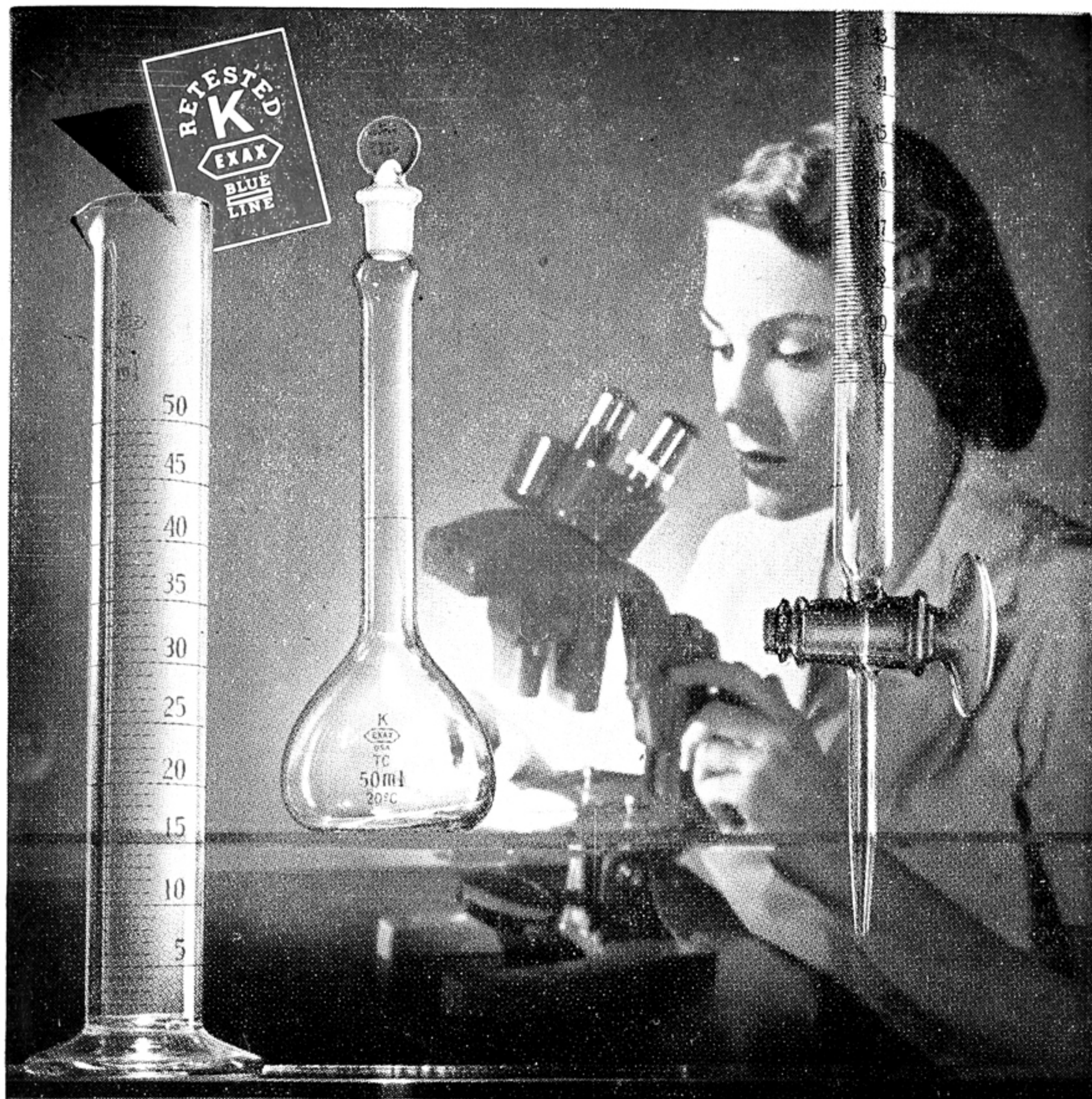
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MARCH MEETING

JOINT A.C.S. – A.I.Ch.E.

AT

NEW YORKER CAFE in TACOMA

MARCH 13, at 8:00 P. M.

SPEAKER

DR. W. N. CARSON JR.

OF HANFORD

SUBJECT: "THE FUEL CELL"

APRIL MEETING

PUGET SOUND SECTION

OF

AMERICAN CHEMICAL SOCIETY



TIME — APRIL 14, 1952, 8:00 P. M.

PLACE — SEATTLE, 131 BAGLEY HALL, U of W

SPEAKER — DR. NORMAN HACKERMAN of U. of Texas

SUBJECT — MECHANISM OF CORROSION INHIBITION

BIOGRAPHY

NORMAN HACKERMAN

Norman Hackerman was born in Baltimore, Maryland, in 1912. He did both his undergraduate and graduate work at Johns Hopkins University, receiving his Ph. D. in physical chemistry in 1935. Upon completion of his graduate work he was employed as an assistant professor of chemistry at the Loyola College in Baltimore, Maryland. He then served as research chemist for the Colloid Corporation in Baltimore. In 1941 he was appointed assistant professor in the chemistry department of the Virginia Polytechnic Institute and left there in 1944 to become research chemist on a Manhattan District Project.

In 1945 he joined the chemistry staff of the University of Texas, where he is now professor of chemistry and director of the Corrosion Research Laboratory. His research interests deal principally with the chemistry and physics of surfaces and especially as these phenomena apply to the field of metal corrosion. During the past few years he and his students have published a number of papers on adsorption on metal surfaces and its influence on electrochemical properties and reactivity, and on the passivity of metals.

He is a member of the American Chemical Society, the Electrochemical Society, National Association of Corrosion Engineers, American Association for the Advancement of Science, Phi Lambda Upsilon, and Sigma Xi. He is the Technical Editor of the Journal of the Electrochemical Society.



SUMMARY MECHANISMS OF CORROSION INHIBITION

By Norman Hackerman

Reaction between a metal and its environment is determined by the nature of the reacting components, disposition of reaction products, adsorption, diffusion, and electrochemical changes. Chem-

icals which inhibit these reactions do so by reacting with the metal in place or after dissolution, or by adsorption. The retardation comes about by virtue of one or more of the following: formation of a diffusion barrier, introduction of an ohmic resistance, polarization of the minute cells which exist on the metal surface, production of a non-wettable surface, change in the nature (reactivity) of the ions in the outermost layers of the metal.

The relationship between sorption of the inhibiting substance and such properties as steady state electrode potentials, and metal dissolution rates have been investigated by a variety of techniques. These include direct weight change, volumetric effects, radiotracer methods, and radio-autographs.

It has been found that a chromium-VI containing anion is irreversibly adsorbed to the extent of about half a monolayer on steel and other metals. The pick-up was found to be a sensitive function of pH and this in turn has been related to the anionic composition of the solution, e. g., Cr_2O_7 , HCrO_4 , CrO_4 , OM. The competitive effects of chloride ion and of sulfate ion on chromium-VI adsorption have also been investigated. The contact potentials of metals pre-exposed to the chromate solutions were measured relative to platinum and the results interpreted in terms of orientation of the adsorbed particle and charge separation on the metal surface for a sufficiently high chromate concentration. Below this concentration the gross anodic and cathodic areas are readily apparent on the autograph.

The extent of adsorption of polar organic molecules on metals has been found to be dependent mainly on chain length while firmness of adsorption is primarily a function of the polar group (s). These findings have been related to the reactivity of the treated metal as determined by dissolution rates or by the effect on electrode potential. Of all the materials studied those containing a sulfur atom with an unshielded electron

(Continued on Page 3)

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SUMMARY (Continued)

pair produced the greatest effects. The orientation and packing of the adsorbed molecules were studied by reflection of an electron beam impinging on the metal surfaces at a low angle. The hydrophobic character of metal surfaces pretreated with some of these materials is considered in terms of these results.



U. of W. Professor Honored

A University of Washington graduate who made good has honored the professor who helped to start him on the road to success.

The University of Washington Board of Regents Saturday approved the establishment of the "Herman V. Tartar Fund" in the department of chemistry and chemical engineering, which was made possible by a \$5000 gift from Samuel G. Baker of Wilmington, Del., a 1925 graduate.

The fund tentatively will total \$15,000 over a period of three years. The money will be used for graduate fellowships, visiting lecturers and seminars.

Baker, an executive of the E. I. DuPont de Nemours & Co., requested the fund be named after his former teacher "in recognition of Dr. Tartar's many contributions to the department and the affectionate regard in which he is held by its alumni."

Dr. Tartar has been on the faculty of the chemistry and chemical engineering department since 1918. He was head of the department from 1947 to 1949 when he reached the age of retirement for department heads.

Baker, a chemical engineer, is manager of the photo products department of the DuPont company.



We learn wisdom from failure much more than from success. We often discover what will do by finding out what will not do; and probably he who never made a mistake never made a discovery.—Smiles.

U. S. NEEDS MORE SCIENTIFIC AND TECHNICAL HELP

NEW YORK, February 21.—The Soviet Union may win world leadership in 20 years without having to resort to war if the United States fails to overcome its critical shortage of scientific and technical manpower, Dr. Walter J. Murphy, American Chemical Society editor of Washington, D. C., warned leaders of the nation's pulp and paper industry today.

"Russia did not draft scientists and technologists in World War II as we did, nor did she strip her schools of technology as we did," Dr. Murphy declared, and "there is every reason to believe Russia is training more scientists and technologists than we are today."

If the United States continues on its present path, "it is questionable that we can maintain superiority in science for much more than a decade," Dr. Murphy asserted at a luncheon held in the Hotel Commodore by the Technical Association of the Pulp and Paper Industry, which closes its four-day annual meeting there today.

"Stalin, and particularly his younger associates, are sitting in the Kremlin firmly convinced that scientific and technical manpower is the big mistake we will make that will sound the death knell of democracy for a thousand years," the speaker said.

When it comes to total manpower, the United States can never hope to match the Iron Curtain countries, Dr. Murphy pointed out, and that is why the safety of the United States depends so much upon superiority in science and technology. Yet, he said, if World War III were to break out tomorrow, the chances are "we would duplicate on technical manpower all the incredibly stupid mistakes of World War II," and would be defeated.

Selective Service is now being administered more intelligently than in World War II, Dr. Murphy conceded, but there is a "basic flaw" in the Selective Service Act which gives local draft boards the

(Continued on Page 10)

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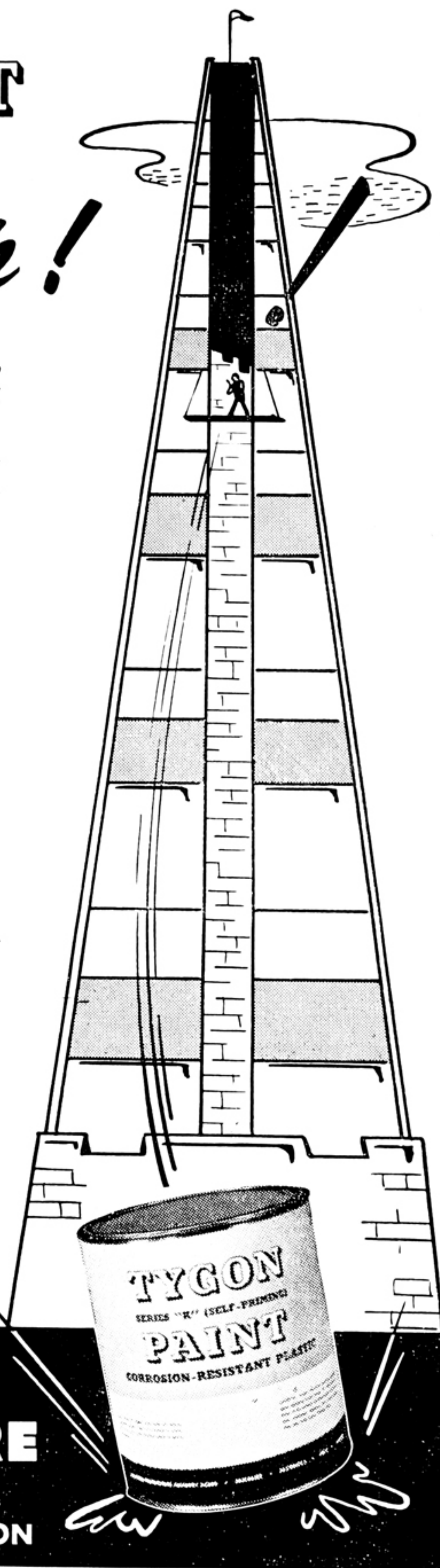
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authority to draft scientists and technologists as well as students of science and technology. Experience has shown, he asserted that local draft boards are not qualified to judge wisely on the matter of deferments for scientists.

Emphasizing that neither the American Chemical Society nor any other professional group of scientists is trying to obtain blanket deferments for its members, the speaker said scientists and technologists must be used where they serve the country best. Those performing essential services in industry or education should be permitted to continue their essential work, and those taken into the armed forces should be assigned to tasks requiring their special skills, he declared.

"We do not draft doctors in order to put them in the Army, Navy, Air Force, or Marines as combatants," he pointed out. "We must not waste our scientific talent, either."

Dr. Murphy advocated establishment of a national board of scientists and technologists to handle the deferment problems of technical personnel, as recommended by the Scientific Manpower Advisory Committee of the National Security Resources Board. Congress has refused to accept this recommendation, he noted, and probably will continue to do so for fear the public might not approve such a system.

The only way to change this situation, Dr. Murphy said, is to convince the public that the national interest requires the deferment of key scientists and technologists. The public must somehow be made to realize, he explained, that modern warfare is far different from the type of military activity which characterized the Spanish-American War.

"Indeed," he continued, "the discovery of the atom bomb, guided missiles, nerve and poison gases, the use of destructive bacteria as a possible weapon—all these have changed radically the relationship of the soldier and the civilian. It is important to point out that the most potentially dangerous spot to be in if we

have an all-out war is a highly industrialized city."

Dangerous as the present shortage of technically trained men may be, Dr. Murphy added, it threatens to become worse during the next few years as the result of a steady decline in the number of scientists and engineers being graduated from college. In the engineering field, he stated, there were 50,000 graduates in 1950—a record total made possible by the thousands of veterans who took advantage of the educational provisions of the G. I. Bill of Rights.

"Prior to the outbreak in Korea, it was estimated that at least 30,000 to 40,000 engineering graduates a year would be needed to keep the pipelines filled," Dr. Murphy continued. "Now we discover that for the next four years there will be steady decline in the number of the graduates and that along about 1954 the number will be somewhere between 12,000 and 17,000. And, of course, a relatively high percentage of those graduated will be taken by the armed forces. While statistics on scientists are not as readily available as they are for engineers, it is very evident the supply of individuals with Ph. D. training is declining and the number will continue to decline at least through 1960."

Among the reasons for this trend, the speaker said, is the uncertainty confronting the young man who knows that some time between his eighteenth and twenty-sixth years he will have to serve two or more years in the armed forces. He also knows that to be a scientist he must study for seven to ten years, and he knows that even then he will have no guarantee of a successful career. Also, he may have been told that if he does enter science or technology he probably will not earn so much as a bricklayer.

Actually, Dr. Murphy said, most competent scientists and technologists receive a greater annual income than skilled artisans, but nevertheless their take-home pay has not increased to so great an extent in recent years, and this creates dissatisfaction.

(Continued on Page 12)

AWARDS Administered by the American Chemical Society

A number of awards listed below, are administered by the American Chemical Society. Now is the time to put some thought on the question whether or not some individuals in this Section may be qualified to receive some of these awards. Please communicate with Dr. Joseph L. McCarthy at the University of Washington for further information.

Please act soon.

Awards Administered by the American Chemical Society—

The awards administered by the American Chemical Society have won just renown throughout the scientific world. In large measure, this is a result of the careful canvass made for nominees and the high degree of discrimination displayed in selecting recipients.

It is hoped that the following description of these awards and the procedures for nomination of candidates and the selection of recipients will be of interest to the members and helpful to those who have candidates to propose.

NOMINATIONS FOR AWARDS

Any member of the Society (except a member of the Award Committee) may submit one nomination for each award, except the Priestley Medal. Such proposal must be accompanied by a biographical sketch of the nominee (including date of birth), a list of his publications and patents, specific identification of the work on which the nomination is based, and an evaluation and appraisal of the nominee's accomplishments, particularly the work to be recognized by the proposed award.

Eight copies of this material (including seconding letters), must be furnished for distribution to the members of the Award Committee. The nomination and its accompanying material must be received by the Executive Secretary before June 1 of the year preceding that in which the award is to be made.

MARCH, 1952

ACS AWARD IN PURE CHEMISTRY

Purpose. To recognize and encourage fundamental research in pure chemistry carried out in North America by young men and women.

Nature. The award consists of \$1,000 and a diploma setting forth the reasons for the award.

BORDEN AWARD IN THE CHEMISTRY OF MILK

Purpose. To recognize and encourage outstanding research achievements in the chemistry of milk in the United States and Canada.

Nature. The award consists of \$1,000 and a gold medal.

ELI LILLY AND COMPANY AWARD IN BIOLOGICAL CHEMISTRY

Purpose. To stimulate fundamental research in biological chemistry (excepting therefrom immunology, clinical investigations, pharmacology, and experimental therapeutics) by young chemists working in the colleges and universities of the United States.

FISHER AWARD IN ANALYTICAL CHEMISTRY

Purpose. To recognize and encourage outstanding contributions to the science of analytical chemistry, pure or applied, carried out in the United States or Canada.

FRITZSCHE AWARD

Purpose. To recognize and encourage outstanding achievement in analysis, research, and new applications of essential oils, essential oil isolates, and related chemicals.

Nature. The award consists of \$1,000 and a gold medal.

GARVAN MEDAL

Purpose. To recognize distinguished service to chemistry by women chemists, citizens of the United States.

Nature. The award consists of a suitably inscribed gold medal.

(Continued on Page 14)

Technical Help (Continued)

"Industry can no longer afford to ignore the inequality that exists between the financial return of the professional employee and that of the non-professional," he declared.

Appealing to employers of professional workers to take a long-range view of the problem, Dr. Murphy urged them to make sure that their professional employees were satisfied, and also to participate in vocational guidance work in an attempt to bring competent young men and women into science and technology.

"Unless we meet the technical manpower problem immediately with foresight and a very remarkable degree of intelligence," he warned, "world leadership may pass to the Soviets in two decades."



OREGON NEWS

Dr. George Gorin has joined the staff of the Chemistry Department at the University of Oregon as Assistant Professor. Dr. Gorin was born and raised in Como, Italy, but received his secondary and collegiate education in this country. He obtained his B. A. from Brooklyn College in 1944 and his Ph. D. at Princeton in 1949, with a thesis on some organic sulfur compounds. He worked at Rutgers University for two years on the isolation of a naturally occurring drug. His most recent position was at Purdue where he worked on fluorocarbon lubricants for the Air Forces. Dr. Gorin will teach advanced courses in physical-organic chemistry, as well as service courses in the Department.

Professor Pierre J. Van Rysselberghe has returned to the University of Oregon after a leave of absence of eighteen months in Europe. Dr. Van Rysselberghe held a Fulbright grant at the Politecnico of Milan, an institution comparable to one of our larger institutes of technology, for the academic year 1950-51. In addition to research and writing, Dr. Van Rysselberghe attended a number of scientific meetings in Belgium, France, Switzer-

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land, Spain, and Italy. Many of these meetings dealt with various aspects of the thermodynamics of electrolyte systems and the corrosion of metals. Dr. Van Rysselberghe will be the evening speaker at the annual meeting of the Oregon Academy of Science in Eugene on Friday, February 22, where he will tell his impressions of European science. The public is invited.

In addition to many scientific lectures, most of which were given in French, Dr. Van Rysselberghe gave a series of popular lectures in Italy and Sicily on the American educational system. These lectures were given in Italian and were sponsored by the U. S. Information Services (U.S.I.S.).



Perfection does not exist; to understand it is the triumph of human intelligence; to expect to possess it is the most dangerous kind of madness.—Alfred de Musset.

WESTERN SCIENTISTS



Dr. Thomas G. Thompson

Dr. Thomas G. (Tommy) Thompson was born in New York 63 years ago, and has been a faculty member of the University of Washington since 1919. He served as Chairman of the Puget Sound Section for three years, from 1922 to 1925. Recently retiring as Director of the Oceanographic Laboratories and until a short time past connected with the chemistry department, he is actively continuing his work as Professor of the Oceanographic Laboratories.

At the time of organization of the laboratories in 1930, he received a \$400,000 grant (figure that out in terms of 1952 dollars!) from the Rockefeller Founda-

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tion. In April, 1951, Dr. Thompson received one of the highest honors awarded to a scientist in the nation—election to the National Academy of Sciences, which functions as scientific advisor to the federal government. The first University of Washington scientist to be so honored, Dr. Thompson has been taking honors in his stride for many years.

In 1948 he received the Agassiz Gold Medal of the National Academy of Sciences. He has traveled extensively. He was representative of the National Research Council and of the National Academy of Sciences at various meetings in different parts of the world and represented the National Research Council and Geophysical Union at the congresses of the International Union of Geodesy and Geophysics, and also at congresses of the Pacific Science Association. Dr. Thompson has served as Chairman of the International Committee on Oceanography of the Pacific, Pacific Science Congress, since 1935. He is a member of the Geophysical Union and of the Oceanography Society of the Pacific (president, 1936). From 1935 to 1938 he served as President of the Oceanographic Section of the American Geophysical Union, and in 1947 was President of the Pacific Division of the American Association for the Advancement of Science.

Dr. Thompson served in both World Wars. He was Director of the U. S. Army School, Seattle, 1942-43; member of the Chemical Warfare Board, 1943-44; technical director of the San Jose Project, Panama, 1944-46; and captain in the Chemical Warfare Service, 1942-46.

As a member of the International Association of Physical Oceanography, Dr. Thompson directed the establishment of standard units and procedures for chemical oceanography. He and his students have developed methods and techniques to determine many elements which are in sea water, and Dr. Thompson has directed much general oceanographic research in the Puget Sound and North Pacific Ocean areas. It is not unlikely that the contributions he has made to

the development of his students and associates will prove of even greater importance than his own contributions to science.



AWARDS (Continued)

IPATIEFF PRIZE

Purpose. To recognize outstanding chemical experimental work in the field of catalysis or high pressure, carried out by men or women of any nationality and not over forty years of age.

Nature. The award will consist of the income from a trust fund and a diploma setting forth the reasons for the award. The financial value of the prize may vary but it is expected that it will be approximately \$3,000 and that it will be awarded every three years.

PAUL-LEWIS LABORATORIES AWARD IN ENZYME CHEMISTRY

Purpose. To stimulate fundamental research in enzyme chemistry in the United States by young men and women.

Nature. The award consists of \$1,000 and a gold medal. An allowance of \$150 is provided for traveling expenses to the meeting at which the award will be presented.

PRECISION SCIENTIFIC COMPANY AWARD IN PETROLEUM CHEMISTRY

Purpose. To recognize, encourage, and stimulate outstanding research achievements in the field of petroleum chemistry in the United States and Canada.

Nature. The award consists of \$1,000 and a certificate. An allowance of \$150 is provided for traveling expenses to the meeting at which the award will be presented.

PRIESTLEY MEDAL

Purpose. To recognize distinguished services to chemistry.

Nature. The award consists of a gold medal designed to commemorate the work of Joseph Priestley. It may not be awarded more than once to the same in-

dividual. The traveling expenses incidental to the conferring of the medal are paid.

SCIENTIFIC APPARATUS MAKERS AWARD IN CHEMICAL EDUCATION

Purpose. To recognize outstanding contributions to Chemical Education.

Nature. An award of \$1,000 and a suitably inscribed certificate. An allowance of \$150 is provided for traveling expenses to the meeting at which the award is made.



Great Ideas of Western Man

If there be a country which cannot stand any one of these tests—

a country where knowledge cannot be diffused without perils of mob law and statute law;
where speech is not free;
where the post office is violated, mail bags opened, and letters tampered with;
where public debts and private debts outside the state are repudiated;
where liberty is attacked in the primary institution of social life;
where the laborer is not secured in the earnings of his own hand;
where suffrage is not free or equal—
that country is, in all these respects, not civil, but barbarous; and no advantage of soil, climate, or coast can resist these suicidal mischiefs.

—Ralph Waldo Emerson, 1862



A gate watchman on a construction job observed a certain workman heading out the gate trundling a wheelbarrow filled with straw. Knowing that this particular man was light-fingered, the watchman suspected that something was hidden in that straw. So, he stopped the man with his wheelbarrow and searched assiduously through the straw. He found nothing, and finally, reluctantly allowed the workman to pass. He was vexed for he was sure something was crooked. A day or so later the same workman approached to pass out the gate, again with

a wheelbarrow filled with straw. This time the watchman said to himself, "Aha! He thinks he has lulled my suspicions. This time there really will be something hidden in the straw." So he searched, and again he failed to detect and thievery. Once more, reluctantly, he let the man pass. The same episode occurred every day or so for quite a while. Each time the watchman searched the straw carefully but never was he able to find anything hidden.

About a year later, the watchman encountered the suspect thief and said, "Joe, tell me—on that job last year when I used to search the straw in your wheelbarrow—what in the world were you stealing?" The workman's reply: "Wheelbarrows."



JOE, THE INVENTOR

Joe is a gadgeteer. A very promising gadgeteer. He invents gadgets and patents them. Then he tries to market them. He is very persistent and keeps on trying.

The other day he came up with the newest, 100 per cent efficient, time and labour saving, accurate and precise Chem-o-Stir-o-Magnetomicrocentrifuge.

It centrifuges in a chem-o-stir-o-magneto fashion. Despite its size (it occupies the space of a large desk) it is a micro instrument. Joe had it patented. Next he conducted a survey. Surveys always help. They make statistics and statistics tell what you want them to. Joe called professors from all the departments of his university and asked their criticism. Here is what they said:

HISTORIAN: I've never read of it.

ANTHROPOLOGIST: Where did you find it?

PSYCHOLOGIST: It might help prevent neurosis.

ART PROF.: It is beautiful.

FRENCH PROF.: Cherchez la femme.

PHILOSOPHER: It is.

The comments on the whole were favorable. Joe did not consult with the science departments.

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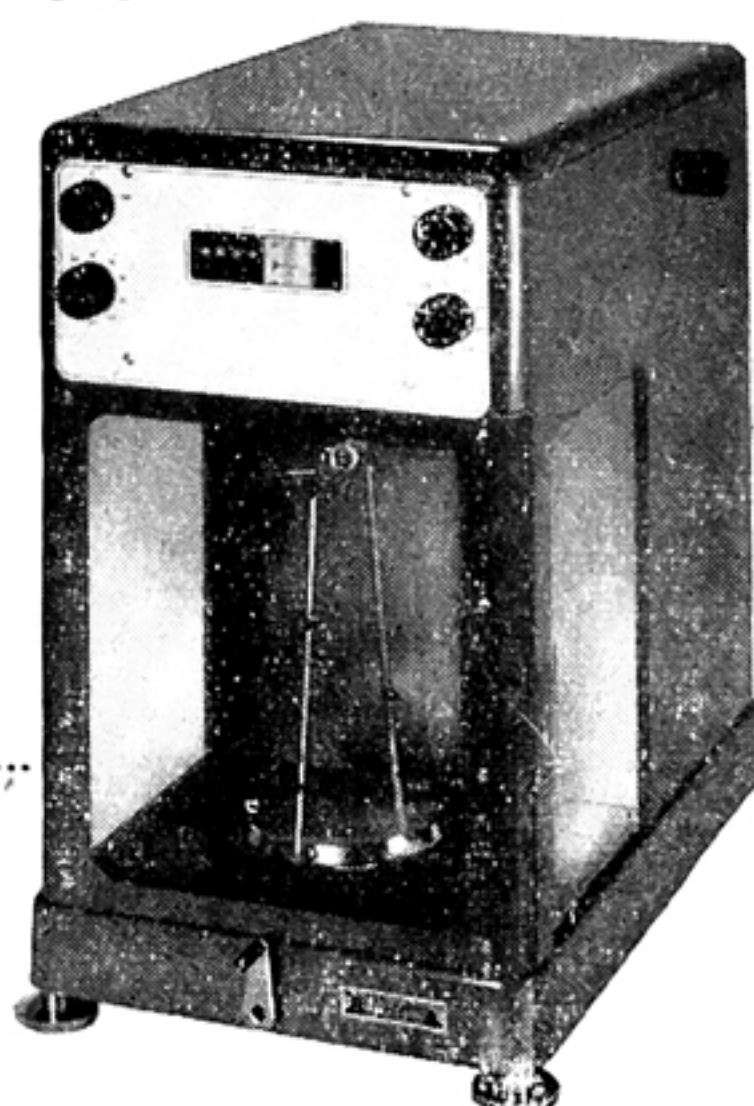
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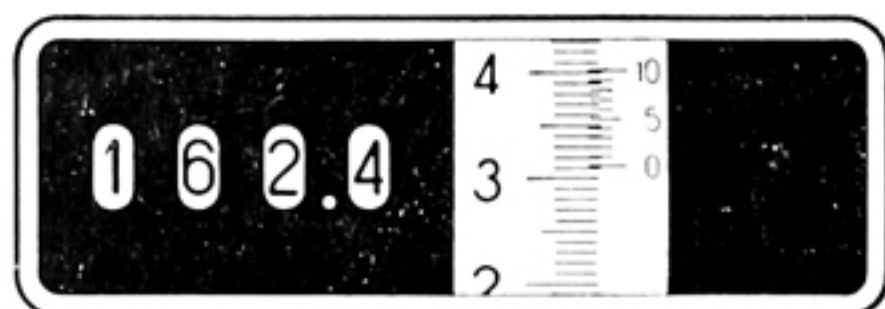
Weights under 100 milligrams are
indicated automatically.

The Gram-atic Balance weighs
samples up to 200 grams and has
constant sensitivity throughout this
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For 115 and 230 volt 50-60 cycle
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Fast (20 second weighing)
**Eliminates all weight
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Beam under constant load
One-scale reading
Constant sensitivity
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Entire weight of sample
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