DOWNLOAD PDF WALTHER NERNST AND THE TRANSITION TO MODERN PHYSICAL SCIENCE

Chapter 1 : Walther Nernst | Biography & Third Law of Thermodynamics | racedaydvl.com

The winner of the Nobel Prize for Chemistry, Nernst was a key figure in the transition to modern physical science with his contributions to the study of solutions, of chemical equilibria, and of the behavior of matter at the extremes of the temperature range.

See Article History Alternative Title: His theoretical and experimental work in chemistry, including his formulation of the heat theorem, known as the third law of thermodynamics , gained him the Nobel Prize for Chemistry. Through their joint investigations of phenomena in solutions, in particular the transport of electricity and matter, these investigators, who became collectively known as the Ioner Ionists , not only obtained important new insights into chemical reactions but also established the independence of what became known as modern physical chemistry. Early research In Leipzig , Nernst devoted himself to the calculation of the diffusion coefficient of electrolytes for infinitely dilute solutions and to the establishment of a relationship between ionic mobility, diffusion coefficients, and the electromotive force in concentration cells. He developed this work more fully in his habilitation university teaching certificate thesis of , in which he established a fundamental connection between thermodynamics and electrochemical solution theory the Nernst equation. In Nernst was offered academic positions in Munich and Giessen. Immersed in both chemistry and electrotechnology, Nernst spent a decade of intensive research into improving the incandescent lamp. He found that magnesium oxide, which is a nonconductor at room temperature, becomes a perfect electric conductor at higher temperatures, emitting a brilliant white light when employed as a filament. In he began work on the electric lightbulb, for which he obtained numerous patents in Europe and the United States. Third law of thermodynamics In Nernst was appointed professor and director of the Second Chemical Institute at the University of Berlin and a permanent member of the Prussian Academy of Sciences. The next year he announced his heat theorem, or third law of thermodynamics. In practical terms, this theorem implies the impossibility of attaining absolute zero, since as a system approaches absolute zero, the further extraction of energy from that system becomes more and more difficult. Modern science has attained temperatures less than a billionth of a degree above absolute zero, but absolute zero itself can never be reached. It had been hoped that the direction of a chemical reaction and the conditions under which equilibrium is attained could be calculated only on the basis of the first two laws of thermodynamics and thermal measurements. From this form of the Gibbs-Helmholtz equation, it was then possible to calculate the integration constant on the basis of calorimetric measurements carried out in the laboratory. However, Nernst proceeded to extrapolate the validity of his theorem to gaseous systems. For this purpose, he embarked on a series of difficult and time-consuming experiments at low temperatures, where gaseous substances could be considered to be in a condensed phase. Between and , Nernst and his many students and collaborators in Berlin designed a number of ingenious instruments, such as a hydrogen liquefier, thermometers, and calorimeters. These were used for the determination of specific heats for a series of substances. In a paper published in , Albert Einstein had shown that the new theory of quantum mechanics , developed initially by the German theoretical physicist Max Planck in , predicts that, in the vicinity of absolute zero temperature, the specific heats of all solids tend toward absolute zero. As a result, Nernst became one of the earliest wholehearted supporters of Einstein and quantum mechanics. In particular, Nernst was instrumental in organizing the First Solvay Congress in Physics, held in Brussels in November , which was devoted to a thorough evaluation of the new quantum hypothesis by a group of leading European physicists. Later years Nernst was engaged in military and administrative efforts, including chemical warfare research, during World War I , in which his two sons were killed. Walther Hermann Nernst with a piano he constructed, Between and , Nernst was president of the German national bureau of physical standards.

Chapter 2 : Walther Nernst - Wikipedia

Walther Nernst and the Transition to Modern Physical Science, by Diana Kormos Barkan. Cambridge: Cambridge University Press, Pp. xii+; illustrations, bibliography, index. $ This scientific biography of the German physical chemist Walther Nernst () is not a heroic tale, but.

Franklin Medal Signature Walther Hermann Nernst, ForMemRS [1] 25 June â€" 18 November was a German chemist who is known for his theories behind the calculation of chemical affinity as embodied in the third law of thermodynamics , for which he won the Nobel Prize in chemistry. Nernst helped establish the modern field of physical chemistry and contributed to electrochemistry , thermodynamics and solid state physics. He is also known for developing the Nernst equation. Nernst had three older sisters and one younger brother. The third sister died due to cholera. Nernst went to elementary school at Graudenz. In , he finished his habilitation at University of Leipzig. Personal attributes It was said that Nernst was mechanically minded in that he was always thinking of ways to apply new discoveries to industry. He was a colleague of Svante Arrhenius , and suggested setting fire to unused coal seams to increase the global temperature. He was a vocal critic of Adolf Hitler and Nazism , and his three daughters married Jewish men. Nernst invented , in an electric lamp , using an incandescent ceramic rod. His invention, known as the Nernst lamp , was the successor to the carbon lamp of Edison and the precursor to the tungsten incandescent lamp of his student Irving Langmuir. Nernst researched osmotic pressure and electrochemistry. In , he established what he referred to as his "New Heat Theorem", later known as the Third law of thermodynamics which describes the behavior of matter as temperatures approach absolute zero. This is the work for which he is best remembered, as it provided a means of determining free energies and therefore equilibrium points of chemical reactions from heat measurements. Theodore Richards claimed Nernst had stolen the idea from him, but Nernst is almost universally credited with the discovery. In , the impressionist painter Max Liebermann painted his portrait. In Nernst showed his support for German militarism by signing the Manifesto of the Ninety-Three. In , after studying photochemistry , he proposed the atomic chain reaction theory. The atomic chain reaction theory stated that when a reaction in which free atoms are formed and can decompose molecules into more free atoms which results in a chain reaction. His theory is closely related to the natural process of Nuclear Fission. In , he received the Nobel Prize in chemistry in recognition of his work in thermochemistry. In , he became director of the Institute of Physical Chemistry at Berlin, a position from which he retired in Nernst went on to work in electroacoustics and astrophysics. The piano used electromagnetic pickups to produce electronically modified and amplified sound in the same way as an electric guitar. His device, a solid-body radiator with a filament of rare-earth oxides, that would later be known as the Nernst glower , is important in the field of infrared spectroscopy. Continuous ohmic heating of the filament results in conduction. The glower operates best in wavelengths from 2 to 14 micrometers. He was relatively unknown in Zurich in , and people said "Einstein must be a clever fellow if the great Nernst comes all the way from Berlin to Zurich to talk to him. A named professorship at the top university in Germany, without teaching duties, leaving him free to do research. He was independently wealthy, due to his success with the Nernst lamp. So, in , Einstein returned to Berlin and was appointed Director of the newly created Kaiser Wilhelm Institute for Physics and a Professor at the Humboldt University of Berlin , with a special clause in his contract that freed him from most teaching obligations. Nine papers â€" " Ger. Verlag Harri Deutsch , c. Enke, [5th edition,].

Chapter 3 : Walther Nernst - The Full Wiki

Nernst, who won the Nobel Prize for Chemistry, was a key figure in the transition to a modern physical science, contributing to the study of solutions, of chemical equilibria, and of the behavior of matter at the extremes of the temperature range.

Nernst went to elementary school at Graudentz. His mother is said to have been Polish by the Polish newsmagazine wprost. Nernst invented , in an electric lamp , using an incandescent ceramic rod. His invention, known as the Nernst lamp , was the successor to the carbon lamp and the precursor to the incandescent lamp. Nernst researched osmotic pressure and electrochemistry. In , he established what he referred to as his "New Heat Theorem", later known as the Third law of thermodynamics which describes the behavior of matter as temperatures approach absolute zero. This is the work for which he is best remembered, as it provided a means of determining free energies and therefore equilibrium points of chemical reactions from heat measurements. Theodore Richards claimed Nernst had stolen the idea from him, but Nernst is almost universally credited with the discovery. In , he received the Nobel Prize in chemistry in recognition of his work in thermochemistry. In , he became director of the Institute of Physical Chemistry at Berlin, a position from which he retired in Nernst went on to work in electroacoustics and astrophysics. The piano used electromagnetic pickups to produce electronically modified and amplified sound in the same way as an electric guitar. His device, a solid-body radiator with a filament of rare-earth oxides, that would later be known as the Nernst glower , is important in the field of infrared spectroscopy. Continuous ohmic heating of the filament results in conduction. The glower operates best in wavelengths from two to 14 micrometers. Personal life Nernst married in to Emma Lohmeyer with whom he had two sons and three daughters. He was a vocal critic of Adolf Hitler and Nazism , and two daughters married Jewish men. Publications Walther Nernst, "Reasoning of theoretical chemistry: Nine papers " Ger. Verlag Harri Deutsch, c. Enke, [5th edition,]. LCCN po See also.

Chapter 4 : racedaydvl.com | Walther Nernst and the Transition to Modern Physical Science | | Diana

Primarily a scientific biography of Walther H. Nernst (), one of Germany's most important, productive, and often controversial scientists, this book addresses a specific set of scientific problems that evolved at the intersection of physics, chemistry, and technology during one of the most revolutionary periods of modern physical science.

Walther Nernst Walther Nernst made a significant breakthrough with his statement of the Third Law of Thermodynamics, which holds that it should be impossible to attain the temperature of absolute zero in any real experiment. For this accomplishment, he was awarded the Nobel Prize for chemistry. In addition to his important work with thermodynamics, Walther Nernst made contributions to the field of physical chemistry. While still in his twenties, he devised a mathematical expression showing how electromotive force is dependent upon temperature and concentration in a galvanic, or electricity-producing, cell. He later developed a theory to explain how ionic, or charged, compounds break down in water, a problem that had troubled chemists since the theory of ionization was proposed by Svante A. He attended the gymnasium at Graudenz now Grudziadz , Poland, where he developed an interest in poetry, literature, and drama. For a brief time, he considered becoming a poet. He was awarded his Ph. His doctoral thesis dealt with the effects of magnetism and heat on electrical conductivity. Ostwald had been introduced to Nernst earlier in Graz by Svante Arrhenius. These three, Ostwald, Arrhenius, and Nernst, were to become among the most influential men involved in the founding of the new discipline of physical chemistry , the application of physical laws to chemical phenomena. The first problem Nernst addressed at Leipzig was the diffusion of two kinds of ions across a semipermeable membrane. He wrote a mathematical equation describing the process, now known as the Nernst equation, which relates the electric potential of the ions to various properties of the cell. The Nernsts had five children, three daughters and two sons. At the same time, he also received approval for the creation of a new Institute for Physical Chemistry and Electrochemistry at the university. Published in , it had an almost missionary objective: The book became widely popular, going through a total of fifteen editions over the next thirty-three years. In , for example, he developed a theory for the breakdown of ionic compounds in water, a fundamental issue in the Arrhenius theory of ionization. According to Nernst, dissociation, or the dissolving of a compound into its elements, occurs because the presence of nonconducting water molecules causes positive and negative ions in a crystal to lose contact with each other. The ions become hydrated by water molecules, making it possible for them to move about freely and to conduct an electric current through the solution. In later work, Nernst developed techniques for measuring the degree of hydration of ions in solutions. In , Nernst addressed another fundamental problem in solution chemistry: He constructed a mathematical expression showing how the concentration of ions in a slightly soluble compound could result in the formation of an insoluble product. That mathematical expression is now known as the solubility product, a special case of the ionization constant for slightly soluble substances. Four years later, Nernst also developed the concept of buffer solutions â€”solutions made of bases, rather than acidsâ€”and showed how they could be used in various theoretical and practical situations. Around , Nernst was offered a position as professor of physical chemistry at the University of Berlin. This move was significant for both the institution and the man. Chemists at Berlin had been resistant to many of the changes going on in their field, and theoretical physicist and eventual Nobel Prize winner Max Planck had recommended the selection of Nernst to revitalize the Berlin chemists. At Berlin, he began to search out, define, and explore new questions. Certainly the most important of these questions involved the thermodynamics of chemical reactions at very low temperatures. Attempting to extend the Gibbs-Helmholtz equation and the Thomsen-Berthelot principle of maximum work to temperatures close to absolute zero â€”the temperature at which there is no heatâ€”Nernst eventually concluded that it would be possible to reach absolute zero only by a series of infinite steps. In the real world, that conclusion means that an experimenter can get closer and closer to absolute zero, but can never actually reach that point. The theory is now more widely known as the Third Law of Thermodynamics. In , Nernst was awarded the

Nobel Prize in chemistry in recognition of his work on this law. In order to accomplish this objective, new equipment and new techniques had to be developed. At the time he first proposed the theory, Nernst had ignored any possible role of quantum mechanics. A few years later, however, that had all changed. In working on his own theory of specific heats, for example, Albert Einstein had quite independently come to the same conclusions as had Nernst. In turn, Nernst eventually realized that his Heat Theorem was consistent with the dramatic changes being brought about in physics by quantum theory. Even as his work on the Heat Theorem went forward, Nernst turned to new topics. One of these involved the formation of hydrogen chloride by photolysis, or chemical breakdown by light energy. Chemists had long known that a mixture of hydrogen and chlorine gases will explode when exposed to light. In , Nernst developed an explanation for that reaction. When exposed to light, Nernst hypothesized, a molecule of chlorine Cl_2 will absorb light energy and break down into two chlorine atoms 2Cl. The atom of hydrogen will then react with a molecule of chlorine, forming a second molecule of hydrogen chloride and another atom of chlorine. The process is a chain reaction because the remaining atom of chlorine allows it to repeat. In , Nernst resigned his post at Berlin in order to become president of the Physikalisch-technische Reichsanstalt. He hoped to reorganize the institute and make it a leader in German science, but since the nation was suffering from severe inflation at the time, there were not enough funds to achieve this goal. As a result, Nernst returned to Berlin in to teach physics and direct the Institute of Experimental Physics there until he retired in In addition to his scientific research, Nernst was an avid inventor. Around the turn of the century, for example, he developed an incandescent lamp that used rare-earth oxide rather than a metal as the filament. Although he sold the lamp patent outright for a million marks, the device was never able to compete commercially with the conventional model invented by Thomas Alva Edison. Nernst also invented an electric piano that was never successfully marketed. He was personally opposed to the political and scientific policies promoted by Adolf Hitler and his followers and was not reluctant to express his views publicly. In addition, two of his daughters had married Jews, which contributed to his becoming an outcast in the severely anti-Semitic climate of Germany at that time. Walther Nernst was one of the geniuses of early twentieth-century German chemistry, a man with a prodigious curiosity about every new development in the physical sciences. He was a close colleague of Einstein, and was a great contributor to the organization of German scienceâ€" he was largely responsible for the first Solvay Conference in , for example. In his free time, he was especially fond of travel, hunting, and fishing. Little is known about his years after his retirement. Nernst died of a heart attack on November 18, , at his home at Zibelle, Oberlausitz, near the German-Polish border. Farber, Eduard, editor, Great Chemists, Interscience, , pp.

Chapter 5 : Walther Nernst | Revolvy

Walther Nernst and the Transition to Modern Physical Science (review) Richard H. Beyler Technology and Culture, Volume 41, Number 2, April , pp. (Review).

Nernst had three older sisters and one younger brother. His third sister died of cholera. Nernst went to elementary school at Graudenz. Personal attributes[edit] It was said that Nernst was mechanically minded in that he was always thinking of ways to apply new discoveries to industry. His hobbies included hunting and fishing. He was a friend and colleague of Svante Arrhenius , and suggested setting fire to unused coal seams to increase the global temperature. After Hitler came to power they emigrated, one to England and the other to Brazil. Nernst had a severe heart attack in Nernst started university at Zurich in , then after an interlude in Berlin , he returned to Zurich. They discovered the Nernst effect: Ostwald recruited him to the first department of physical chemistry at Leipzig. Nernst moved there as an assistant, working on the thermodynamics of electrical currents in solutions. There, he wrote a celebrated textbook Theoretical Chemistry, which was translated into English, French, and Russian. He also derived the Nernst equation for the electrical potential generated by unequal concentrations of an ion separated by a membrane that is permeable to the ion. His equation is widely used in cell physiology and neurobiology. The carbon electric filament lamp then in use was dim and expensive because it required a vacuum in its bulb. Nernst invented a solid-body radiator with a filament of rare-earth oxides, known as the Nernst glower , it is still important in the field of infrared spectroscopy. Continuous ohmic heating of the filament results in conduction. The glower operates best in wavelengths from 2 to 14 micrometers. It gives a bright light but only after a warm-up period. Nernst sold the patent for one million marks, wisely not opting for royalties because soon the tungsten filament lamp filled with inert gas was introduced. With his riches, Nernst in bought the first of the eighteen automobiles he owned during his lifetime and a country estate of more than a five hundred hectares for hunting. He increased the power of his early automobiles by carrying a cylinder of nitrous oxide that he could inject into the carburetor. He showed that as the temperature approached absolute zero, the entropy approaches zero â€" while the free energy remains above zero. This is the work for which he is best remembered, as it enabled chemists to determine free energies and therefore equilibrium points of chemical reactions from heat measurements. Theodore Richards claimed that Nernst had stolen his idea, but Nernst is almost universally credited with the discovery. Nernst was so impressed that he traveled all the way to Zurich to visit Einstein, who was relatively unknown in Zurich in , so people said: In they traveled to Switzerland to persuade Einstein to accept it; a dream job: In the following year, the impressionist painter Max Liebermann painted his portrait. In , the Nernsts were entertaining coworkers and students they had brought to their country estate in a private railway car when they learned that war had been declared. The tide turned at the battle of the Marne. When the stalemate in the trenches began, he returned home. He contacted Colonel Max Bauer , the staff officer responsible for munitions, with the idea of driving the defenders out of their trenches with shells releasing tear gas. Nernst was awarded the Iron Cross second class. As a Staff Scientific Advisor in the Imperial German Army , he directed research on explosives, much of which was done in his laboratory where they developed guanidine percolate. Then he worked on the development of trench mortars. When the high command was considering unleashing unrestricted submarine warfare, he asked the Kaiser for an opportunity to warn about the enormous potential of the United States as an adversary. They would not listen, Ludendorff shouted him down for "incompetent nonsense. Both sons had died at the front. In , after studying photochemistry , he proposed the atomic chain reaction theory. It stated that when a reaction in which free atoms are formed that can decompose target molecules into more free atoms would result in a chain reaction. His theory is closely related to the natural process of Nuclear Fission. In , he and his family briefly fled abroad because he was one of the scientists on the Allied list of war criminals. Later that year he received the Nobel Prize in chemistry in recognition of his work on thermochemistry. He was elected Rector of Berlin University for He set up an agency to channel government and private funds to young scientists and declined becoming Ambassador to the United States. For two unhappy years, he was the president of the Physikalisch-Technische Reichsanstalt National Physical Laboratory , where he could not cope with the "mixture of mediocrity and red tape". The piano used electromagnetic pickups to produce electronically modified and amplified sound in the same way as an electric guitar. He studied the theories of cosmic rays and cosmology. In , Nernst learned that a colleague, with whom he had hoped to collaborate, had been dismissed from the department because he was a Jew. Nernst immediately taxied to see Haber to request a position in his Institute, which was not controlled by the government, only to learn that Haber was moving to England. Soon, Nernst was in trouble for declining to fill out a government form on his racial origins. He retired from his professorship but was sacked from the board of the Kaiser Wilhelm Institute. He lived quietly in the country; in he traveled to Oxford to receive an honorary degree, also visiting his eldest daughter, her husband, and his three grandchildren. Publications[edit] Walther Nernst, "Reasoning of theoretical chemistry: Nine papers â€” " Ger. Verlag Harri Deutsch , c. Enke, [5th edition,].

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His formulation of the Nernst heat theorem helped pave the way for the third law of thermodynamics , for which he won the Nobel Prize in Chemistry. He is also known for developing the Nernst equation in Nernst had three older sisters and one younger brother. His third sister died of cholera. Nernst went to elementary school at Graudenz. Personal attributes It was said that Nernst was mechanically minded in that he was always thinking of ways to apply new discoveries to industry. His hobbies included hunting and fishing. He was a friend and colleague of Svante Arrhenius , and suggested setting fire to unused coal seams to increase the global temperature. He was a vocal critic of Adolf Hitler and Nazism , and two of his three daughters married Jewish men. After Hitler came to power they emigrated, one to England and the other to Brazil. Nernst had a severe heart attack in They discovered the Nernst effect: Ostwald recruited him to the first department of physical chemistry at Leipzig. 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Chapter 7 : Project MUSE - Walther Nernst and the Transition to Modern Physical Science (review)

Synopsis. One of Germany's most important, productive and often controversial scientists, Walther H. Nernst () was at once the first "modern" physical chemist, an able scientific organizer and a savvy entrepreneur.

Importantly, Nernst was the first German chemist to become a disciple of the new physical chemistry. They later would become estranged, and Arrhenius would play a large part in preventing Nernst from receiving the Nobel Prize until Were Nernst and Arrhenius chemists or physicists? As it becomes clear on reading both volumes, it is difficult to tell where one discipline ends and the other begins. His now famous dissertation was written between March and June , and divided into an experimental and theoretical part. In the theoretical part, Arrhenius explained the results of the first, by introducing the concept of active conducting and inactive non-conducting molecules, and the activity coefficient, which elaborated on the Clausius-Williamson hypothesis that assumed the molecules were dissociated before the current was applied, and that all ions had the same amount of electricity. His ideas concentrated on the physics of corpuscles, and the physical processes of constants, laws, and effects, not on chemical transformations. When he established that the ions were charged, but did not explain anything about the nature of the ions themselves, Arrhenius answered questions from physics, not chemistry. Chemists focussed on the nature of electrolytes, and the prevailing solution theory in chemistry, advocated by Armstrong, Mendeleev, and Raoult, supposed chemical reactions, the formation of hydrates, between solute and solvent. This theory influenced Arrhenius, but he would eventually replace it with a more physical theory. During the s, Arrhenius moved into the area of cosmic physics, or geophysics, which had originally been institutionalized in Austria before it took root and flourished in Sweden in the s primarily at the Swedish Physical Society. In , Arrhenius would link the levels of carbon dioxide specifically to climate. The result was a detailed chart of the expected change in temperature with CO2 content, according to latitude, that clearly showed a rise in temperature with increasing CO2 content. Madsen had been involved in the current debate in immunology between the cellular or biological and humoral or chemical theories of immune response, and had favored the cellular theory. Armed with these results, Arrhenius became convinced of the physico-chemical nature of the immunological response, and set the stage for the conflict with Paul Ehrlich. Crawford provides an excellent summary of sources of the conflict between Ehrlich and Arrhenius. Ehrlich saw the practical uses of serum therapy, whereas Arrhenius was interested in the purely intellectual scientific questions of immune response. Arrhenius emphasized the simplicity of solutions a carryover from his view of simple ions in solution and kinetics, with a minimum of hypotheses. As a result, Ehrlich considered interaction between cell and pathogen irreversible, involving new, undissociable chemical bonds. Arrhenius, on the other hand, considered the process to be equilibrium-governed. In doing so, she casts doubt on the traditional demarcation of scientists into specific disciplines. Barkan divides her treatment of Nernst into three parts. In , he moved to Leipzig, where he became acquainted with the methods and techniques of the new physical chemistry under Wilhelm Ostwald, where he focussed on understanding, in a physical sense, the nature and causes of electromotive force in galvanic cells. The theoretical problem of light emission from a high temperature filament, and the problem of producing a constant illumination required Nernst to thoroughly understand the behavior of materials and the variation of physical constants such as specific heats and molecular weights at high temperature. Upon his move to Berlin in , Nernst shifted to the measurement of specific heats at low temperatures, when he realized that a consequence of the difference between the heat and work of a chemical reaction should asymptotically reach zero at low temperatures. Nernst then developed new technology with the sensitivity required for measuring specific heats of materials at supercooled temperatures. In the third part, of less interest to the philosophy of chemistry, Barkan analyzes the incorporation of the heat theorem within the chemical and physical communities, culminating in the Nobel Prize of A slightly more detailed discussion of how the lamp worked and how it related to his initial study of conductivity, would have helped enormously. Most obvious is the constantly shifting border between physics and chemistry and the identifying characteristics of both sciences. Both Arrhenius and Nernst were trained as physicists, yet ultimately both received Nobel Prizes in chemistry. How are we to identify their work as uniquely chemical or physical? But moving from chemistry to biology, there seem to be greater differences between explanations deriving from different disciplines. As Crawford makes clear, the dispute between Arrhenius and Ehrlich over immunochemistry is particularly relevant for understanding how methodology and theory are shaped by disciplinary constraints.

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Chapter 8 : Formats and Editions of Walther Nernst and the transition to modern physical science [raceday

Walther Hermann Nernst, ForMemRS (25 June - 18 November) was a German chemist known for his work in thermodynamics, physical chemistry, electrochemistry, and solid state physics.

More on the Nernst lamp Photo-Induced Chain Reaction Walther Nernst suggested a chain reaction mechanism for the photo-induced reaction of chlorine with hydrogen in order to explain the large value of the quantum yield. Zur Kenntnis der photochemischen Reaktionen. Nach Versuchen von W. Sometimes the order of the names is reversed, i. Ettingshausen is misspelled as Ettinghausen. Closely related are the Ettingshausen Effect and the Nernst Effect. Nernst, The minimum current that causes a stimulation increases proportionally to the square root of the frequency. This law was supposed to hold for alternating currents of short duration. It is based on the hypothesis that an electric current causes displacements of ions and related changes in concentrations close to the cell membranes which act as reversible electrodes. A fixed amount of electrical energy is required to cause a nerve stimulation. A closely related law was derived for short pulses of direct currents. Eucken and Miura, R. Zur Theorie der elektrischen Reizung. Zur Theorie des elektrischen Reizes. Physiologie - ; DOI: It was invented and designed by Nernst in , together with the companies Bechstein mechanical parts and Siemens electrical parts. The sound of the instrument resembles that of an electric guitar rather than an acoustic piano. About 15 - 20 or perhaps up to about , according to another source instruments were built of which about five are still in existence. However, only two are still functioning; one is at the Technisches Museum Wien Vienna Museum of Technology , the other one is at Berlin. Recently, the latter was played in the following performances: Nernst, working on a single string model of the electro-acoustic piano Neo-Bechstein. Die Umschau 35 - with 2 photographs Carl Bechstein.

Chapter 9 : Walther Nernst Memorial

Auto Suggestions are available once you type at least 3 letters. Use up arrow (for mozilla firefox browser alt+up arrow) and down arrow (for mozilla firefox browser alt+down arrow) to review and enter to select.