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Wilhelm Ostwald

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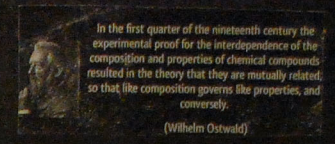
WILHELM OSTWALD



In the first quarter of the nineteenth century the experimental proof for the interdependence of the composition and properties of chemical compounds resulted in the theory that they are mutually related, so that like composition governs like properties, and conversely.

(Wilhelm Ostwald)

Friedrich Wilhelm Ostwald

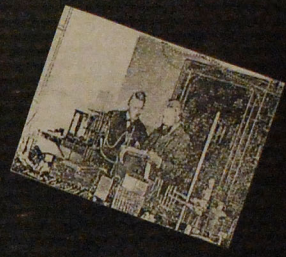
German chemist Friedrich Wilhelm Ostwald was born on September 2 1853 in Riga, Lativa as the son of Master-Cooper Gottifried Wilhelm Ostwald and Elizabeth Leuckel. Wilhelm had two more brothers and completed his early studies at the "Real gymnasium" and then attended Dorpat University for higher studies. In 1875 he obtained his bachelors degree and completed his masters degree the following year. After this he obtained the post of assistant at the Physics Institute under professor Arthur Joachim von Oettingen after this he transitioned to a similar position in the chemistry laboratory under Carl Schmidt. Ostwald then maintained a position as professor of physical chemistry at Lepzig University. Ostwald even served one term as the first "exchange professor" at Harvard University, Cambridge in 1904-1905.

Ostwald began experimental work in 1875 by investigating the law of mass action of water in relation to the problems of chemical affinity. This lead to the discovery of the law of dilution which is also named after him. Ostwald introduced the word "mole" in the 1900s. Ostwald defined one mole as the molecular weight of a substance in mass grams. According to Ostwald the concept was linked to the ideal gas. Ostwald's development of the mole concept was linked directly to his philosophical opposition to the atomic theory. Ostwald soon became one of the founders of classical physical chemistry and wrote many books. In 1894 he founded the "Deutsche Bunsen-Gesellscaft Fur Angewandte Physilcalische Chemie" (German Bunsen- society for applied physical chemistry). Today, the German Bunsen- society for applied physical chemistry is known as the German Bunsen-society for physical chemistry and is a non-profit that aims to promote research and technical advances in the area of physical chemistry.

After his retirement in 1906 he continued his studied/publications on philosophy and became active in public life (i.e. middle class pacifist movement). In 1909 Ostwald was awarded the Nobel Prize for chemistry for his work on catalysis, chemical equilibrium and reaction velocities.

Chemistry

Wilhelm Ostwald was a German Physical chemist. Physical chemistry can be defined as the study of how matter behaves on a molecular and atomic level in addition to how reactions occur. Physical chemists focus on understanding the physical properties of atoms and molecules, the way chemical reactions work, and what these properties reveal. Ostwald recognized the lack of quantities understandings of general issues in chemistry, such as selective forced (chemical affinities or activities). He sought to achieve by applying both physical measurement and mathematical reasoning. In 1875 he began studying the equilibrium point in an aqueous solution in which two acids compete to form an acid-base reaction that contains one base. Ostwald's later work on catalysis stemmed from attempts at taking reaction velocities as a measure of chemical activity. He recognized catalysis as the change of reaction velocity by a frozen compound that allowed him to measure catalytic activities.



Contribution

Wilhelm Ostwald discovered the law of dilution in 1888. Ostwald tested this law by measuring the electrical conductivities of more than 200 organic acids. Ostwald's dilution law is the application of the law of mass action to weak electrolytes in solution.

⇒ For example: if a weak acid dissociates in water.

$HA \rightleftharpoons H^+ + A^-$

$K_a = \alpha^2 ni(1-\alpha)V$

α= degree of dissociation
ci= initial amount of substance
V= volume
K = ionization constant or dissociation constant

Ostwald developed a process and patented it in 1902. His most famous contribution to applied chemistry was on catalytic oxidation of ammonia to nitric acid. This patented process is still used today in industrial fertilizer production.

Ostwald also conducted studies on chemical dynamics. He believed to fill the gap in which he determined the velocities of analogous reactions under the influence of substances whose affinity was otherwise known from equilibrium experiments. The purpose of his studies was to determine the affinity of starches, the results of which give decisive results for the extinction of specific determinants of affinity that he treated. The method employed him to determine the intensity of the chemical force from the loss of weight of metal cylinders that have undergone the same changes. The purpose of the experiments is the investigation of the relation between the velocity and division coefficients.

His direct experiments have showed that under his experimental conditions, the quantity of nitrogen (which was one of the things being tested) developed to the present is in a constant state. Ostwald employed to determine the amount of ammonia salt formed during the reaction in addition to uncharged acetamide. He went about this with the suffecient accuracy by means of underbromic acid of the oxotometer. Since pure acetamide isnt decomposed by a bromine solution. He determined the rate of transformation which acetamide undergoes various conditions by different acids. Direct experiments showed that under experimental conditions the quantity of nitrogen developed to the present is in a constant state.

Chlorammonium.	Stickstoff.		
	Gef.	Ber.	Theorie.
0,1	1,36	1,34	1,40
0,2	2,66	2,68	2,80
0,3	3,99	4,02	4,20
0,5	6,70	6,70	7,00
1	13,43	13,40	14,00
2	26,80	26,80	28,00

Chemical equilibria

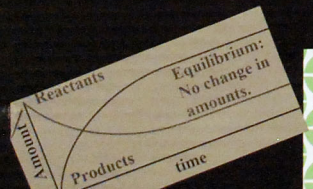
Chemical equilibrium is a state in which the rate of the forward reaction equals the rate of the backward reaction; meaning there is no net change in concentrations of the reactions and products. This is also known as dynamic equilibrium.

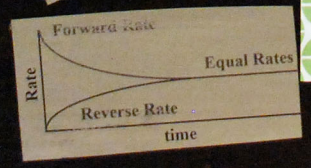
Catalysis

Catalysis can be defined as "the causing or accelerating of a chemical change by the addition of a catalyst." A catalyst can be defined as "a substance that causes or accelerates a chemical reaction without itself being affected." In 1894, Ostwald revealed that substance (catalyst) can affect the chemical reaction speed although it isn't included in the end products.

Claim to Fame

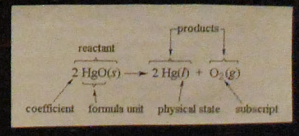
Wilhelm Ostwald is a German Chemist who was awarded the Nobel Prize in 1909 in recognition of his work on catalysis and for his investigations into the fundamental principals governing chemical equilibria and rates of reaction.





Chemical reactions:

Chemical reactions occur when chemical bonds between atoms are formed or broken. The substances that go into a chemical reaction are called reactants and what is produced at the end of the reaction are the products. And arrow is used to indicate the direction of the chemical reaction. The process of recognizing atoms by breaking one set of chemical bonds and making a new set known as chemical reactions.



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