Controlled Transmutation of Elements Under Surprisingly Mild Conditions?

Introduction

Bockris and Minevski of Texas A&M University recently reported experimental results that strongly suggest that palladium atoms near the surface of hydrogen atom-saturated catalysts are transformed into atoms of other elements under certain mild electrical conditions.
Minzuno, Ohmori and Enyo reported similar results with palladium catalysts saturated with deuterium atoms. The isotope make up of the elements produced were quite different than that which occurs in nature.
It is extremely difficult (perhaps impossible) to explain these experimental results, unless one accepts that transmutation has occurred.
This article will attempt to demonstrate that experimental results reported prior to 1930 lead to a similar conclusion.

Discussion

Between 1910 and 1930, many experimenters (some extremely well respected) reported the mysterious appearance of hydrogen, helium and neon in electrical discharge tubes.
E.C.C. Baly, a Fellow of the Royal Society, summarized pertinent results in the Annual Reports of the Chemical Society for 1924 (pages 41 to 47) and 1920 (pages 27 to 35). He published results of his own experiments with R.W. Riding in 1925 and 1926. They concluded that nitrogen atoms had been converted into helium and neon during their high voltage electrical discharge experiments.
On February 13, 1914, Professor J. Norman Collie, Fellow of the Royal Society, presented a speech[1] to the society. He described several experiments he performed and those reported by others in which hydrogen, helium and neon gases mysteriously appeared in electrical discharge tubes. The last paragraph of his speech follows:

"This fact cannot be explained by air leakage, for air contains four or five times as much neon as helium. At present the investigation was only begun; many more experiments would have to be made for the source of the helium and neon was still obscure; but if it could be proved that these gases were produced from many metals and other substances under the influence of cathode discharge, it is obvious that it would be a discovery of the most far-reaching importance." [2]

These experiments were later described in greater detail.
In 1923, Baly performed many variations of Collie's experiments with R.A. Bailey[3]. They found neither helium nor neon.
In a short paper, Robert Goddard, the pioneer rocket scientist, discussed the apparent production of rare gases in discharge experiments. The final paragraph of the paper follows:

"It is by no means certain, however, that the action in question consists simply in the liberation of absorbed gases, for Sir J.J. Thomson has discovered evidence of genuine production of helium and X_3 from elements (lead) and chemical compounds (salts of sodium and potassium) which suggests an actual atomic change, if not a genuine disintegration. The whole problem is very complicated, and it is the writers purpose merely to call attention to the importance of surface conditions in the production of rare gases."[4]

X_3 was later found to be H_3 (triatomic hydrogen), which has a half-life of about one minute[5].
Sir J.J. Thomson was awarded the Nobel Prize in physics and is known as the discoverer of the electron. In a book originally published in 1913, he described the production of helium and neon during the bombardment of various chemicals with cathode rays. The following quotes are from this book: [6]

"To test whether this was the source of the helium I bombarded soluble salts such as LiCl, NaCl, KCl, KI, RbCl, $AgNO_3$ which were dissolved in water and also in some cases in alcohol and then evaporated to dryness, the process being in some cases repeated several times. Salts which had been treated in this way yielded helium and in some cases neon; the yield of helium from these salts of the alkali metals and in particular from potassium was exceptionally large, KI giving a larger supply than any other of the substances I examined, with the exception of those like monazite sand which are known to contain large supplies of helium. Some of the salts have yielded apparently undiminished supplies of helium, after being dissolved and evaporated ten or twelve times."[7]

"The aluminum cathode in the tube used to bombard the substances with cathode rays might be suspected as a source of helium. If this were the case, however, the rate of production of helium would not depend upon the nature of the salt bombarded, nor would it make any difference as to whether the cathode rays hit the salt or not. As both these conditions have a great influence on the rate of production of helium we may regard this source as eliminated. In addition to the proceeding considerations some of the cathodes have been in almost continuous use for months without any perceptible diminution in the rate of supply of helium."[8]

If the helium and neon had diffused through the glass walls of the apparatus, the nature of the salt bombarded would have had no effect on the rare gas concentration.

"The view that helium can be got out of other chemical elements raises questions of such a fundamental character that few will be prepared to accept it until every other explanation has been shown untenable. It would greatly strengthen the proof if we could detect the parts of the atom which remain when the helium is split off."[9]

Perhaps, some of the atoms recently detected[10,11] are parts of atoms that remain when helium is split off.

In 1925, Riding and Baly[12] reported results of experiments performed in a discharge tube having a concave cathode, which focused onto a hollow aluminum anticathode coated with a thin nitride film. A discharge in low-pressure oxygen (below 2 torr.) produced measurable helium after 42 hours. The following quotes are from their article:

"At that time the suggestion was made to us by Prof. Masson that the results obtained by him in conjunction with Collie and Patterson might be due to the disintegration of nitrogen, this element being present in the form of nitride as a surface film on the electrodes."[13]

"The first experiments were carried out with hydrogen, but negative results were obtained. On replacing the hydrogen with oxygen a positive result was at once obtained, since after 42 hours discharge a small quantity of helium was formed. Emphasis must be laid on the fact that many previous experiments with the same induction coil and the same design of discharge tube, without a nitride layer, no trace of rare gas was ever obtained" [14]

"On repetition of this experiment, the discharge being passed for longer periods (90 to 100 hours), it was found that hydrogen, helium and neon were formed. It is of considerable interest to note that the relative proportions of helium and neon were the same as those obtained by Collie and Patterson."[14]

"We would again emphasise the fact that no trace of either helium or neon is formed in the absence of nitride film, and this would seem to exclude the presence of an air leak, since it is not possible to believe in a leak which only occurs when the anticathode is coated with nitride. In addition to this, we have many times confirmed the well-known fact that the spectrum of the residual gas left after treatment of air with charcoal cooled in liquid air shows only the spectrum of neon. These results would suggest that the rare gases found by Collie and his coworkers were due to the atomic disintegration of nitrogen and not to synthesis from hydrogen. This conclusion has been confirmed by a number of subsequent experiments which may be briefly described."[14]

Other experimenters have shown that helium and neon from the air slowly diffuse through very hot glass walls into vacuum. The reasons for this view were summarized by Robert W. Lawson of the University of Sheffield. However, this does not explain the appearance of these gases only when oxygen is present and the anticathode has a nitride coat.
The following Quotes are from Baly and Riding's 1926 paper[15] :

"We have now carried out some further experiments which would seem to confirm our original results. In the first place, both helium and neon have been obtained by passing the discharge between a concave aluminum mirror as cathode and a magnesium anode through a mixture of oxygen and nitrogen under reduced pressure. No trace of the rare gases was formed if the discharge were passed in the opposite direction; and since in this series of experiments the two types of discharge were used alternatively, the same mixture of oxygen and nitrogen was used, and the apparatus was not changed in any way,

this would obviate any possible criticism that the rare gases had their origin in an air leak."[16]

It also obviates any possibility that the rare gases had diffused through the walls of the apparatus.

"As regards to the origin of these gases, we believe that they arise from the disintegration of the nitrogen atom. Attention may be directed to the fact that hydrogen is always to be found in the residual gases along with the helium and neon, although the greatest possible care was taken to remove it from the electrodes before each experiment. At the same time it may be pointed out that in spite of all precautions it is impossible to secure the total absence of oxides of carbon."[17]

Baly and Riding's conclusion that nitrogen atoms are transformed into helium and neon atoms (and possibly other atoms) under their experimental conditions, did not conform to the, then, or present views of theoretical nuclear physics. They measured the emission spectra of gaseous products. They did not measure non-gaseous products. Bockris and Minervski's[10] results, confirmed by Mizuno, Ohmori and Enyo[11] suggest that, under somewhat different conditions, palladium atoms are transformed into platinum, silicon and zinc and possibly other atoms. They did not measure gaseous products.

Conclusion

The simplest conclusion from the above observations is that transmutation of elements has taken place under surprisingly mild conditions. Theoretical nuclear scientists find that such a conclusion defies one of their time-honored concepts. I, for one, am willing to consider that their concept is incorrect.

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