ASTRONOMY

Gold in the Sun

Evidence obtained for the first time of presence of gold in the spectrum of the sun brings total of earth elements found on sun up to 66.

➤ EVIDENCE of gold in the golden sun has been obtained for the first time, Dr. Charlotte E. Moore of Princeton University Observatory and Dr. Arthur S. King of Mt. Wilson Astrophysical Laboatory, have announced to the Astronomical Society of the Pacific. Discovery of gold makes a total of 66 elements positively or tentatively identified in the sun out of the 90 found so far upon the earth.

The evidence depends chiefly upon the fact that one of the strongest radiations or spectrum lines emitted by gold in the form of a glowing vapor agrees closely in position with a weak unidentified line in the spectrum of the sun.

It was already known that gold is so scarce in the sun that only the strongest lines observed in the laboratory would be likely to appear as very weak lines in the solar spectrum.

Unfortunately, the strongest gold line of all—its so-called ultimate line—is hidden from view in the solar spectrum by the powerful ozone absorption bands of the earth's upper atmosphere. So little was known about the remaining strong lines of gold that occur in the observable parts of the solar spectrum that it was useless to attempt their identification.

The situation until two years ago was somewhat similar to that of a miner who has a map showing the location of several dozen veins of gold within a huge mountain side, all of which are very thin with one exception. He would like to bore for this single rich vein but he does not know which one it is.

However, when the results of an investigation of the sensitiveness of lines in gold spectrum became available in 1941, the search for gold in the observable region of the sun's spectrum could proceed with more certainty.

It would be highly appropriate if the critical line upon which the identification depends occurred in the yellow-orange part of the spectrum. Actually it is in the ultraviolet, invisible to the eye but readily observable by photography.

One possible source of error remained that might invalidate the entire proceedings. The position of the solar line was obtained from a catalogue of the solar spectrum compiled over half a century ago by the famous physicist, H. A. Rowland of Johns Hopkins University.

Some of the weakest lines listed by Rowland do not appear on modern plates, although the same plates may show other weak lines not observed by him. This is particularly true near the ultraviolet limit of the solar spectrum. In addition, this line of gold is what is known as a "low temperature line" or one that is strong in comparatively low temperature sources of light. Therefore, it should appear stronger in sunspots, where the temperature is about 8000 degrees Fahrenheit, than in the surrounding surface of the sun at a temperature of 11,000 degrees Fahrenheit.

To check on these points, Harold D. Babcock and Mrs. Mary F. Coffeen of the Mt. Wilson Observatory, made an examination of photographs of the sunspot spectrum taken during the course of a previous investigation. Not only did they find a weak solar line at the proper position but it was also seen to be moderately strengthened in the spot as would be expected of a low temperature line.

They concluded that, "This moderate strengthening in the spot together with the satisfactory correspondence in position of the solar and laboratory lines, would seem to justify the statement that gold is now identified in the sun."

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PHYSICS

Radium Method Difficult

Measuring large quantities of water by means of minute quantities of dissolved radium is not simple. Many sources of error found.

➤ RADIUM in tiny quantities may be used to measure large masses of water, but the method is not as simple as it seems at first glance, Dr. Victor F. Hess, German Nobel Prizeman in physics now at Fordham University, told the American Geophysical Union at its meeting in Washington, D. C.

Some indirect means is desirable for accurately measuring large quantities of water in reservoirs, where direct weighing is not possible. One method that has been tried has been to dissolve a lot of salt in the water, then collect a sample of it as it comes out of the tailrace of the power plant and determine the salt concentration in that.

Some time ago the noted French physicist, Dr. J. Joly, suggested the use of minute amounts of radium, which diffuse rapidly and evenly in water, but he did not do any experimental work on the method himself. Dr. Hess has done so, making use of a large tank in Pennsylvania, loaned for the purpose by a power company.

Sources of error were found to be more numerous than anticipated. There was a tendency for part of the radium to become tied up in insoluble form with "hardening" chemicals in the river water; this could be partly overcome by adding hydrochloric acid. Minute but variable amounts of radium are naturally present in the water, so that their effect has to be measured in advance and proper allowances made. Even the type of glassware used in the laboratory may falsify results unless great care is exercised.

Dr. Hess concluded by cautioning his hearers not to "attempt blindly to set out to measure large volumes of water with too little radium."

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