PSYCHOLOGY

Skin Registers Emotions

"Thin-skinned" and "thick-skinned" as popular estimates of the emotional reactions of an individual have taken on a new meaning as the result of the researches of Dr. David Wechsler, well-known psychologist of New York. Only the thinness or thickness applies not literally, but as an expression of the conductivity or resistance of the skin to slight electric currents. For in Dr. Wechsler's laboratory the skin has been found to be a delicate emotional barometer, greatly increasing its resistance to the passage of electricity when one is quiescent, but permitting the current to go through much more readily when the feelings are even moderately aroused.

Of all the tissues of the body, the skin is one of the best insulators. The flesh and blood within conduct electric currents very easily, but the skin serves as a protection against these as against many other external vicissitudes. But like all non-conductors, it offers much less resistance when it is moist.

It is of this latter fact that the New York psychologist has taken advantage. It is common knowledge that we perspire, sometimes very heavily, under severe emotional stress. The cold sweat of fear, the flushed, damp face of anger, are familiar examples. But even less extreme emotions, it has been found, cause a less perceptible but still unmistakable moistening of the skin.

Dr. Wechsler's procedure is simple. He includes a part of his subject's skin in an electric circuit by having him dip his hands, or even merely two fingers, in salt solutions in which two wires end. In the same circuit he includes a sensitive instrument to detect and record changes of the current.

So long as the subject is sitting still and thinking of nothing in particular, the indicator hangs motionless. But if a sentence is spoken, or an object or picture shown, which arouses his interest, anger or fear, the indicator instantly jumps upward, indicating an increase in the amount of current which has passed, corresponding to a decrease in the resistance of the skin.

One of the first suggestions made for the use of this method was of its possible value in criminology. Naturally a criminal would have a rather marked emotional reaction if some one suddenly snatched away a

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CHEMISTRY

The Secret of Synthetic Petroleum

By Edwin E. Slosson

Current discussion in the newspapers of the combination of the Standard Oil Company of New Jersey with the German Dye Trust for the production of synthetic petroleum has made the American public realize for the first time that constructive chemistry has reached a point where it is to be taken seriously in this field. We had heard for some time rumors that the Germans were experimenting in methods for making artificial motor fuel but then we should expect German scientists to fool around with such a visionary idea. We could understand also why the British, since they had no oil of their own, should take an interest—even a financial interest—in such projects.

But why should we, when our petroleum output had reached an unprecedented height and still had not passed its long-predicted peak, when the oil was pouring from the ground faster than it could be barreled and sold, when Congress is being called upon to put a stopper on our overflowing wells—why should we concern ourselves with the development of a difficult, expensive and untried process for converting coal into coal oil? A patent for the making of gasoline and other things from coal was among the mass of German patents taken over by the Alien Property Custodian when we entered the war and placed in the hands of the Chemical Foundation for the employment of any true-blue American, but nobody cared to call for it.

But now when we see that the very men who are most active in handling natural petroleum are acquiring the rights for making its synthetic competitor, our papers are full of wonder-why editorials. Two kinds of answers are prominent: first, that Standard Oil is preparing for the future when the fluid fossil fuel that we are drawing upon so unwisely and using so wastefully will begin to run out; second, that the process concerned has an immediate application to the working up of heavy oil residues and distillates, asphalts and tars, into gasoline and other valuable products such as alcohols.

Which of these surmises is the main object cannot be determined by the public since the particular process to be employed is still a secret. It is known to be based upon the method for the liquefaction of coal developed by Dr. Friedrich Bergius of Heidelberg, but it is said to involve the use of some unknown catalyst. "Catalyst" is the name given by chemists to a substance which promotes by its mere presence the desired reaction. In this case, for instance, the catalyst may serve to facilitate the joining of the carbon atoms of the coal with the hydrogen atoms from water to form gasoline, somewhat as the brakeman on a train couples together the cars. The original Bergius process was distinguished from its rivals by dispensing with any catalyst and forming the union between carbon and hydrogen by employing high temperature and pressure alone. But apparently for certain purposes that we can only surmise some catalyst is found a useful aid.

The first step in the effort to solve the mystery of the unexplained catalyst is to make a search of the patents recently applied for by the I. G., the combine of chemical industries commonly called the German Dye Trust. One of the catalysts specified is sulphur. Now sulphur is found frequently in coal and oil, where it is regarded as objectionable. For many years the petroleums of some of our richest fields were rejected as unusable because of their sulphurous smell until finally a way was found to eliminate the obnoxious ingredient. It would be funny if the element the chemists worked so hard to get rid of should turn out to be so useful that it is added where wanting. It might be added in the unpleasantly familiar form of hydrogen sulphide which would carry the necessary hydrogen as well.

The high cost of free hydrogen has been regarded by outsiders as an obstacle to the process, but it has been recently revealed that this element may be introduced in the form of steam, or of methane, which occurs in our natural gas or may be made artificially.

Among other catalysts mentioned in the I. G. patents are compounds of nitrogen. Now, nitrogen is also a common component of coal, or it might be introduced in the form of some synthetic compound manufactured from air. Other catalytic agents specified are the rare—or until recently unfamiliar—metals molyb-

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denum, tungsten and chromium, and their compounds, and so many other substances that it is impossible to guess which is to be most employed.

Dr. Bergius explained his process for the transformation of coal into oil before the Pittsburgh Conference on Bituminous Coal with remarkable freedom and frankness, but it was noticed by the audience that he said little or nothing about its catalytic possibilities. In the discussions of the conference several of the experts present tried to elicit his views on this crucial point. His final answer is worth quoting in view of the public interest now aroused on the subject:

"I only wish to have a word to avoid misunderstanding. I want to say that certainly catalytic action occurs also in coal hydrogenation. Yesterday the time was too short to give every detail on this complicated reaction, but I think I remarked at one point that there is catalytic action too, and we found that there are a lot of things, a lot of material, which helps catalytic action."

And he specified among the lot of things which modify the products, favorably or unfavorably, the composition of the ash, the presence of sulphur, iron oxide, alkaline compounds of the carbolic-acid group, and a German synthetic substance known as tetraline, made from naphthalene (well known as mothballs) by the addition of hydrogen. This, he said, "showed the catalytic effects which we know and which will play quite an important part in developing special lines of this process in making the output better." We may surmise that it is among these "special lines" of catalytic action that we may expect the developments which the world awaits.

The same question that is now under discussion, that is, whether the liquefaction of coal would pay in America, was put to the inventor at the Pittsburgh conference, and he replied that, since he had been in this country only a month and prices of labor are so varied, he could not be expected to give an accurate estimate but he ventured the guess that the cost of a ton of finished products here would be about $10.00, not counting the price of the coal used as raw material.

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curtain, revealing the corpse of his victim. But the apparatus can measure reactions much more delicate than that, it is stated.

In one experiment a mathematical problem was set before a mathematician, and his conductivity curve rose to a peak, where that of an ordinary person would not have come out of its regular straight line.

In another test, a number of machine operatives were examined together, and their sensitivity as measured by the apparatus was found to run closely parallel to their known records of comparative skill.

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Marine animals contain zinc, and generally small amounts of copper in their bodies.

Employes of a Massachusetts electrical company play baseball at night on a brightly lighted diamond.

The principle of the thermometer was discovered by Galileo 87 years after Columbus discovered America.