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A TABLE TRICK AND WHAT IT TEACHES

When that stage in the dinner comes when everything has been cleared from the cloth except coffee cups and ash trays, and when those who do not smoke are toying with the extra lumps of sugar instead, then some one may remark: "It's funny that you can't set sugar on fire with a match, isn't it?"

Everybody agrees that it is funny, so funny that they do not believe it. Sugar is food, all foods are combustible if they are not too wet. Those who know more about it are more positive; sugar is a carbohydrate and thus belongs to the same family as paper and wood. Why shouldn't it burn?

So they try it, setting up the domino on the saucer and holding a match to the edge or corner of it. But all they can get is a dull smoulder and a bad smell. The sugar softens, blackens but refuses to inflame.

They turn to the man who propound the paradox and ask: "How do you explain it? Why can't you set sugar on fire?"

He takes his cigar from his mouth and remarks with a quizzical smile, "I can. What I said was that it is funny that you can't.

This starts a chorus of incredulity. "Let's see you", demand the skeptical, "Bet you can't", assert the mercenary-minded, who never takes an interest in a conflict of opinion unless they have money at stake.

He accepts the challenge and perhaps the wagers. He sets up his lump of sugar, touches it with a match and it flames up promptly and goes on burning with a sooty flame.

Only the most observant of the tableful have noticed that he had first clumsily dropped the lump of sugar in the ash tray or with apparent inadvertence had touched it with the tip of his cigar. This is the secret of it, that a slight smear of ash from cigar or cigaret will so lower the ignition point of sugar that the heat of a match is sufficient to set it afire. Yet the ash does not act as kindling. It is not combustible. It has already been burned. And sugar alone will not inflame in the heat of an alcohol lamp, a gas jet or even the powerful Bunsen burner. It merely melts and chars. It may be consumed but does not burn freely.

This curious reaction has been thoroughly studied by Hedvall who had tried all sorts of chemicals on sugar in a Bunsen flame to find out what it is that

causes the effect. The carbonates of sodium and potassium, such as exist in cigar ash, were among the most effective in lowering the temperature of combustion of sugar. Vaious other oxides of alkalies or alkaline earths, such as lime, will work the same. Zinc oxide is the best of all. The sugar touched by this will flame and crackle and burn completely.

Common salt and the sulfates of iron and copper will cause the sugar to burn, but only in part, leaving a black porous residue. Silica and the oxides of the heavy metals have no effect.

This simple experiment is a good example of what the chenist calls "catalysis". He does not know what it is but he has learned how to use it. It has been found in many cases that the presence of a minute amount of an inert substance, like the ash here, will greatly accelerate a reaction and yet is not used up in the process. A finely divided metal often acts as a catalyst. Platinum is the best, but being so expensive some cheaper metal, such as nickel or iron, is more commonly employed. It is by means of such a catalyst that sulfuric acid is now made; that the nitrogen of the air is fixed for use as fertilizer in the form of ammonia or nitrates; that cottonseed pil is combined with hydrogen to form a solid fat. The use of catalysts is adding millions annually to the wealth of the world, yet in most cases the manner of their action is not understood.

READING REFERENCE - Slosson, Edwin E. Creative Chemistry. New York. Century Company, 1920.

GASES DENSE AS METALS IN STARS

Pressure in the interior of the stars is so immense that it breaks the molecule of matter apart, with the result that gases may be compressed to the density of metals and yet behave as gases, according to Prof. A.A. Eddington, English astronomer.

The compressibility of gas under earthly conditions, says Professor Eddington depends upon the size of the gas molecules, which in turn depends upon the number of electrons it contains and upon their orbits about the central nucleus. Gas molecules behave somewhat as rigid spheres, and a limit to possible compression is reached when the spheres become tightly packed.

But at the high temperatures within the stars these spheres are all broken up and a rearrangement of their parts, or electrons becomes a possibility, much as a complicated machine if taken down, may be packed into a smaller space. So Professor Eddington sees no difficulty in assuming that true gases as heavy as platinum, or 20 times as heavy as water, may exist in the interiors of some of the stars.

Similarly he finds it possible that solid matter may be so compressed as to have a density of 50,000 times that of water, or inconceivably greater than anything of which we have any direct knowledge. Such a condition is indicated in the make-up of the star which is a faint companion to Sirius, the brightest star in the sky. This little star apparently has a diameter only about three times that of the earth, while its mass approaches that of the sun. As a result, its density should beaabout 50,000 times that of water.
