CHEMISTRY

Make Sun-Hot Flames

Flames that are only some 800 degrees absolute cooler than those on the sun's surface are being produced in the laboratory today from an ozone and cyanogen mixture.

➤ MAN-MADE flames almost as hot as the sun's surface have been achieved by chemical means, an American chemist reported.

The super-hot flames are not mere laboratory curiosities, but are being used in practical testing of high-temperature materials, and some of the super flames will soon be put to practical uses outside the laboratory.

DR. A. V. Grosse of the Research Institute of Temple University, Philadelphia, described to the 16th International Congress of Pure and Applied Chemistry meeting in Paris, France, flames that have consistently reached temperatures of 8,500 degrees Fahrenheit, or 5,260 degrees on the Absolute scale. The temperature of the sun's surface is approximately 6,000 degrees absolute. Dr. Grosse also predicted the production soon of temperatures of nearly 9,500 degrees Fahrenheit, almost twice the reaction temperature in newer jet engines and over three times the temperature of a blast furnace.

The key to the ultra-high temperatures is in the use of ozone, rather than normal oxygen, in burning hydrogen, cyanogen and other gases. Ozone is an allotropic form of oxygen which occurs in small amounts naturally, but is readily available from commercial suppliers.

A colleague of Dr. Grosse, Dr. A. G. Streng, told SCIENCE SERVICE the hottest flames were produced from ozone-cyanogen mixtures. However, he said, other mixtures producing slightly lower temperatures are more practical.

Charles S. Stokes, a cyanogen flame research chemist and another associate of Dr. Grosse, explained that the cyanogen-oxygen flames, producing temperatures of about 7,700 degrees Fahrenheit, are valuable tools in research on ceramics and other high-temperature materials.

"These flames already are practical outside the laboratory and we have been producing them in large quantities," he said.

The hotter cyanogen-ozone flames, Mr. Stokes said, soon will be practical, routine laboratory tools.

Chemical Jackpot

➤ A HUGE JACKPOT of undiscovered chemical compounds formed at high temperature offers solutions to the problems of modern technology.

This was the suggestion of Dr. Leo Brewer, a University of California chemist, at the chemists' International Congress.

Dr. Brewer said chemists would come up with many new compounds to help solve the problems of jet aircraft and rockets, atomic energy power plants, space flight and new industrial processes of many kinds.

Materials to withstand tremendous heat are one of the prime needs of the new age.

The reason for relatively slow progress so far is the primitive state of knowledge concerning chemical reactions in the high temperature region of 2,000 to 3,000 degrees centigrade, or from 3,600 to 5,400 degrees Fahrenheit.

The state of knowledge is comparable to that of chemistry at ordinary temperatures a century ago when chemists were trying to learn if water were composed of one atom of hydrogen and one of oxygen, or two hydrogen atoms and one oxygen.

Despite recent work, misconceptions of

TECHNOLOGY

Luminescent Panels Made

➤ MOTION PICTURES, "erasable" images and movable "pips" have been produced on luminescent panels as flat as a painting and no thicker than a sandwich, it has been announced by Frank J. Healy, vice president in charge of Sylvania Electric Products' lighting operations.

The panels work on two basic principles: "electroluminescence," or making special phosphors glow by exciting them with an alternating electric current field, and "photo-conductivity," a physical property of some substances that allows them to carry an electric current only when light shines on them.

Three types of the "Sylvatron," or image-producing panels, have been developed. One panel makes it possible to move a little dot of light around electrically.

To do this, a layer of electroluminescent phosphor, which might glow any color, is sandwiched between a fine horizontal "grid" of electrically conducting strips only 1/64 inch wide and a similar grid of vertical strips. When electricity is applied to a horizontal and vertical strip, the little "square" between them glows brilliantly. In a two-inch square, 1,024 of these "squares" can be individually lighted.

The second type of panel can not only produce but "store" images for either fractions of a second or hours, if desired. Hundreds of tiny "columns" 1/32 inch square, cemented on electrically conducting glass, combined with electroluminescent and photo-conducting layers, can be individually "triggered" by a spot of light beamed on them. The light image that forms is itself in contact with the photo-conducting layer, and so keeps itself "turned on" until it is erased.

The third type uses one layer each of electroluminescent phosphor, a photo-conductive layer and an electrically conducting layer to turn an ordinary light image focused on the panel into an image made up of thousands of tiny "dots" on the front of the panel. The device can also change infrared light into blue or green light.

The panels can be used as a combination of the types, and have been produced in two-inch and four-inch sizes, but the size is limited only by the size of the production machinery. Development of the panels was at the General Engineering Laboratory of Sylvania's Lighting Division. Part of the work was carried on in cooperation with Lincoln Laboratories of the Massachusetts Institute of Technology.

While the device is still in the laboratory stage, it is considered advanced enough for development and application by electronics and defense laboratories and under military contracts.

As for television, the panels will not be used "in the foreseeable future," Mr. Healy declared, since they are to be restricted right now to military or special commercial uses.

SYLVATRON—An image-producing panel is shown being put through laboratory tests by Dr. Keith Butler, manager of the general engineering laboratories of Sylvania's lighting division, Salem, Mass., where the Sylvatron was developed. The unit can convert electrical data into simultaneous dots of light, thus reproducing pictures in motion as shown in the photograph.

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what happens at high temperature are still widely held.

The scientist explained that when heat is applied to compounds at ordinary temperatures, the compounds begin to come apart. This leads to the widespread assumption that as things get hotter, the species of molecules get simpler.

"This is not true," Dr. Brewer said, "and in many types of systems one finds quite complex molecules even at very high temperature."

What happens is that as temperatures increase, compounds important at room temperature are converted to new compounds that are usually different. The compounds that predominate at high temperature are unexpected and unpredictable by ordinary chemical rules.

Moreover, compounds are stable at these very high temperatures when they could not even exist at ordinary temperatures.

Science News Letter, August 3, 1957

ENTOMOLOGY

Garden Spider Snares Herself an Insect Dinner

See Front Cover

➤ THE YELLOW-BANDED garden spider shown on the cover of this week's SCIENCE NEWS LETTER has successfully snared herself a fine dinner—perhaps a grasshopper which is a favorite food.

The spider belongs to the subfamily *Argiopinae,* a group of handsome orb web weavers second only to the silk spiders in size. Its technical name is *Argiope aurantia.* The name describes the spider's coloring very appropriately: it is marked with bright yellow or orange spots on a mostly black body.

Large webs, often two feet in diameter, are placed upon shrubs along roadsides, in gardens and around houses.

Science News Letter, August 3, 1957

MEDICINE

Antibiotics Aid Disease

➤ A FATAL FUNGUS disease that usually kills within ten days is apparently increasing due to the widespread use of antibiotics, Dr. C. G. Tedeschi, department of pathology of the Veterans Administration Hospital in Boston, Mass., told SCIENCE SERVICE.

The disease is known as mucormycosis and is caused by a fungus found in moldy bread and other contaminated food. It attacks both animals and man, Dr. Tedeschi said.

The disease is never found existing by itself, but always as a complication of other debilitating conditions such as diabetes, leukemia, severe burns and infections. It gets its start after antibiotic treatment has killed the bacteria that usually compete with the fungus for food.

In healthy individuals the body's defense mechanisms are enough to protect against the fungus. However, when general resistance is extremely low, the fungus invades the blood stream and travels through the entire body, closing off blood vessels and ending quickly in death.

The disease was first reported in the U. S. in 1943, although it had been known in Europe for about 75 years. Now there have been about 12 reported cases in this country, the majority from the South and Midwest. The total number is too small, however, to show any significant geographical or environmental factors.

There is no known drug cure for the disease.

Since 1949 nearly every antibiotic or combination of antibiotics has been tried as a cure, all with no success. Age, sex and race give no clues as to what causes the condition, and children are affected as well as adults. But in every case reported so far there has been a history of a debilitating condition.

Antibiotics cannot be reduced in many of these cases because they are usually necessary to sustain life, but physicians should be aware that their continued use may bring on mucormycosis, the pathologist emphasized.

Fortunately, he said, the disease occurs only rarely and the doctor may have to run the risk of causing its outbreak when he uses antibiotics.

A case of cerebral mucormycosis is reported by Dr. Tedeschi and Dr. J. C. Merriam Jr., also of the VA hospital, in *Neurology* (July).

Science News Letter, August 3, 1957

TEXTILES

Scientists Make Cotton A "Miracle" Fiber

➤ COTTON, at the hands of U. S. Department of Agriculture scientists, is turning out to be as much of a miracle fiber as any coming from the test tube.

Oil simply rolls off the new cottons that have been treated by a "proofing" process at the USDA's research laboratories in New Orleans, La. Scientists there have developed fluorochemical processes that effectively waterproof and oilproof cotton fabrics. Treated fabrics, they report, refuse to soak up moisture. Water drops stay on the surface until they evaporate.

Fully acetylated cotton is another treated cotton that combines the textile's good natural qualities with some desirable synthetic qualities.

FA cotton, as it is called, looks very much like untreated cotton but it is unaffected by acetic acid, acetone, aniline and dioxane, solvents that dissolve some of the synthetic fibers.

It dries faster than untreated cotton and can be ironed with a warm iron. After laundering, pleats may be easily re-pressed or the garment ironed flat and new pleats pressed in.

The cotton, unlike some synthetics, can be dyed a full range of shades and colors.

For industrial uses, such as electrical insulation material, power-transmission belts, conveyor belts, and those requiring exposure to varying conditions of atmospheric moisture, fully acetylated cotton may be the ideal fabric. (See p. 70.)

Experiments have shown that it is very strong with little "give." It is also highly resistant to heat and rot and has good dimensional stability.

The new treated cottons are still in the laboratory stage, with scientists working to perfect their home-grown miracle fiber, but the experimental cottons look promising for home use and industry.

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