

CHEMISTRY

Tires from Trees

Waste from spruce wood may be the material from which tomorrow's synthetic rubber will be made. This rubber may be superior to the synthetic rubber now in use.

► RAW material for tomorrow's synthetic rubber can be obtained from waste from the manufacture of paper from spruce wood, the American Chemical Society was told in Chicago.

This new rubber-making chemical is called PADMS, which is short for para alpha dimethyl styrene. It can replace the usual styrene that combines with butadiene to make GR-S synthetic rubber, the sort now in largest production. Dr. K. A. Kobe and Dr. R. T. Romans of the University of Texas made the report to the chemists.

Now styrene is in very short supply because of the expanded synthetic rubber program and because it is widely used in new synthetic chemical processes. It is made from benzene, obtained from oil or natural gas, and this is the mother material of so many other essential chemical products.

From the by-product of sulfite paper pulp, which is not only waste but a nuisance, chemists can obtain para-cymene which is then converted into PADMS by a process known as catalytic dehydrogenation.

The synthetic rubber made with the kind

of styrene from paper manufacture may even produce better synthetic rubber than the styrene now used. A few experimental batches of synthetic rubber were made with PADMS produced from terpenes by the turpentine or naval stores industry. In the few tires tested, there was a hint that the rubber might be superior to the kind now manufactured, but much larger pilot plant manufacture and extensive road tests of the tires made will be necessary before the scientists can be sure. There is confidence that the new rubber will be just as good as the present synthetic sort.

The paper pulp industry is expected to be willing to install the necessary recovery equipment for the cymene by-product if it would be utilized in large amount by the synthetic rubber industry. And the synthetic rubber plants would be reluctant to convert to the paper pulp raw material unless large supplies were assured.

Synthetic rubber production of the GR-S variety is now above the 400,000-ton-per-year mark due to the war situation and it is expected to increase in coming months.

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MATHEMATICS

From Now On: Math

Mathematics will continue to be vital in the sciences while new application of it in industrial production is expected.

By WATSON DAVIS

Twenty-fourth in a series of glances forward into science.

► MATHEMATICS is called both the queen of the sciences and the handmaiden of technology. Repeatedly in the long upward march of scientific progress, mathematical formulations and theories have led the way to great physical and biological developments.

The atomic bomb—both the A and H varieties—were first built in the formulas of the mathematical physicists. From the standpoint of engineering and technology, mathematics in its various ramifications is a very necessary tool, often creative of new ideas and new applications.

Mathematics as a science is still young and growing. It is by no means static. In fact, several hundred periodicals are

published throughout the world, devoted in whole or in part to mathematical research.

The scientists who work with paper and pencil have new and challenging problems and applications.

One of the plagues in mathematics, as in ordinary life, is in the fact that many problems do not seem to have a solution; that is, they are indeterminate. It used to be thought that everything could be resolved in some way or other if one were only ingenious enough, but it is now known that this is not true, because problems have been found which can be shown to be undecidable.

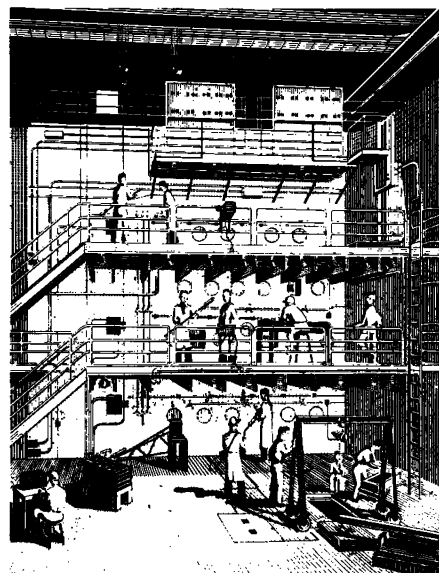
One thing that the mathematicians have been doing is to tackle analysis which is concerned with infinite processes, and turn it into algebra, which is concerned with finite processes. The new methods drop

the infinite out by treating some of these problems in an algebraic way. The algebraic approach provides simpler methods of solution for many practical problems ranging from the design of electrical circuits to gun sights.

Probability, which is basic not alone to gambling but to all human activity, is being put upon a firm mathematical basis and not left to plausible conjectures and paradoxes.

In the control of quality, so important to manufacturing production, mathematics has made recent and important contributions. Statistics are being used to tell manufacturers how often to pick a sample in connection with routine machine production.

For example, if a screw part is being made by an automatic machine it is wasteful to test each part produced to see whether it meets specifications. The trick is to make a test at infrequent intervals while the output is running true to specifications, but to increase the frequency of tests as soon as any divergence from specifications is noted. In this way it is quickly determined whether the divergence is a random fluctuation or whether the machine is really getting out of adjustment.



SCIENTISTS AT WORK—Artist's conception of how scientific experiments will be conducted on the west face of the Brookhaven reactor. Substances are introduced through the round ports or openings in the concrete shield for bombardment by neutrons inside the reactor. The bombardment makes the atoms of most elements radioactive. Beams of neutrons may also be let out of the reactor for studies of neutrons themselves, or for irradiation of various substances including plant and animal cells.