

devoted to the introduction of new alloys of these metals that will further widen their use. The supplies of both are relatively abundant.

The short supply of tin and its comparatively high price during and since the war have led to reductions in its use and in some cases to substitution in alloys, babbitts and solders.

Perhaps the most important developments in the field of substitution are those provided by the industrial chemists who have produced synthetic products that can be used in place of metals in an increasing range of manufactured products. So extensive and successful have these developments been that an increasing number of chemists are prepared to argue that prospective shortages in the field of metals can be disregarded. They cite the case of the nitrate fertilizer industry and the plastics industry as examples of the alchemy of the future.

In a book written by the Chief of the Forest Products Branch of the Food and Agriculture Organization of the United Nations, and significantly entitled "The Coming Age of Wood",¹ the author argues that the material salvation of the world is to be found in a properly managed forest policy. According to his argument wood can supply not only hamburger steaks and fur coats but, suitably treated, can also take the place of metal for almost every purpose in which the latter is now used.

Without accepting all of the claims of the chemical fraternity, it is undoubtedly true that over a very wide range of use synthetics can be employed to relieve the pressure on our mineral resources. It must, however, be recognized that chemicals, which in turn are based on inorganic materials, are employed in the manufacture of those synthetic products. Thus, indirectly, the drain on the mineral resources of the world will continue even though it may be reduced by the use of synthetics. Moreover, it is probable that there will always be certain cases in which the requirement of high resistance to shock and other similar specifications will demand the continued use of metal products. Given the type of civilization that humanity has developed and that is likely to characterize the future of the race, the demand for metals to be used in circumstances of this kind will certainly continue. Consequently, the use of plastics and other similar synthetic products should now be regarded as an important conservation measure; we can only hope that it will eventually develop into a final substitute.

In this connection, however, it should be recognized that considerable progress has been made in the devising of synthetic mineral products. Prior to the first world war Chile was virtually the only source of nitrate for fertilizers and explosives. The development of a process for the manufacture of synthetic sodium nitrate and ammonium nitrate has reduced the world's dependence upon the natural product, although it is significant that the production of natural nitrate has not appreciably declined. Artificial crystals, artificial mica and artificial graphite have all been successfully produced and for some uses are even considered to be superior to the natural product. Perhaps the outstanding development in this field has been the manufacture of the artificial abrasives, silicon carbide and carborundum. These have largely replaced the natural abrasives, corundum and emery, economic deposits of which are relatively rare. Fortunately, the mineral basis of these artificial substitutes, silica, alumina and coke, are in abundant

¹ Glesinger, "The Coming Age of Wood". N.Y. 1949.