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The importance of high pressure in modern chemical technology is too well recognised to merit any elaboration. High pressure and high temperature have long since been the agencies by which sluggish chemical processes have been remarkably accelerated and made commercially successful. Synthetic ammonia, synthetic methanol, synthetic urea, hydrogenation of coal, polythene plastics, high pressure steam, - to mention just a few typical examples - are all well settled industries employing high pressures in the principal operations. Even more remarkable is the revolutionary change that has come about in our outlook towards high pressure, especially during the last ten or fifteen years. Only a few years ago, high pressure was looked upon as an unavoidable, inevitable, last resort.

Among the many workers in the field, the researches of Ipatieff, Haber, Bergius, Fischer, Bone, Newitt, Morgan, Hardy, Reppe, Storch, Pines and Bhattacharyya are outstanding. Just prior to and during the last war, extensive and intensive researches were carried out throughout the world, particularly in Germany by Ruhrchemie A.G. and I.G. Farbenindustrie under the able guidance of eminent chemists like J.W. Reppe and O. Roelen, which resulted in the discoveries of a number of completely new and novel methods of synthesising various organic compounds of great industrial and theoretical importance. As a consequence of Reppe's pioneering researches, the comparatively little known field of the chemistry of carbon monoxide, acetylenes and olefines opened up with

immense possibilities. His researches in acetylene and carbon monoxide chemistry may be divided into four groups : vinylation, ethynylation, polymerisation and carboxylation. As examples of the last group may be mentioned the synthesis of the acrylic acid and its derivatives from acetylene, carbon monoxide and compounds containing active hydrogen atoms, saturated carboxylic acids and their derivatives from olefines, carbon monoxide and compounds containing active hydrogen atoms, carboxylic acids from alcohols and carbon monoxide and also carboxylic acid from ether, carbon monoxide and water using in all cases a carbonyl forming metal like nickel, cobalt or iron as a catalyst.

It is rather surprising that there are not many published papers on the above reactions. Most of Reppe's work were patented, the only available information being found in the various B.I.O.S. and F.I.A.T. Reports and a few published papers. This thesis is concerned with the reactions of carbon monoxide with water to produce formic acid; with acetaldehyde and water to produce lactic acid; and ethylene and water to give propionic acid at high pressures in the presence of catalysts containing nickel, cobalt, iron or their halides. The progress of the reactions have been studied in detail under various experimental conditions and the results which are of definite industrial significance are reported in this thesis.