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Chem Systems' Liquid Phase Methanation/Shift (LPM/S) process economically converts high concentration CO synthesis gas to high Btu Gas. A development program with ERDA/AGA sponsorship has been under way since 1973. Recently the process concept has been extended to handle synthesis gas feeds wherein the hydrogen to carbon monoxide molar ratio is less than 3/1. In the liquid phase system, the methanation reaction and the water-gas shift reaction proceed simultaneously. The hydrogen produced by the shift reaction is utilized immediately for the methanation reaction. With synthesis gas feeds containing less than a 2/1 hydrogen to carbon monoxide ratio, a small amount of additional water (usually in the form of steam) must be added to the system to provide the necessary hydrogen for bulk CO conversion. The effluent gas from the liquid phase reactor is sent to a small, fixed bed, polishing reactor for complete conversion of the carbon monoxide. This paper describes recent experimental work in a bench scale unit and in a larger process development unit (PDU). Results have been correllated using an empirically derived kinetic model. The effect of water addition rate on carbon monoxide conversion and effluent gas composition has been determined for synthesis gas feeds with H_2/CO ratios ranging from 1/1 to 2/1. Life tests have been performed on catalysts under various polishing reactor conditions. Based on the bench scale and PDU results, the economics of the liquid phase methanation/shift process as it would be applied in a commercial size coal gasification plant have been determined.