into the organic compound. Thus, this technique is highly desirable not only in view of the fact that it contributes to various chemical production activities but also from the viewpoint of the reduction of carbon dioxide blamed for global warming, namely, from the viewpoint of the prevention of global warming.

[0005]

Due to the thermodynamic equilibrium of the reaction as well as because the reaction is inhibited by water that is by-produced together with methanol, synthesizing methanol from a material gas with a high carbon dioxide content requires a catalyst exhibiting a higher activity and a higher durability than in the methanol synthesis from a syngas.

[0006]

With such needs, copper-containing multicomponent catalysts such as copper/zinc oxide/aluminum oxide/zirconium oxide and copper/zinc oxide/aluminum oxide/zirconium oxide/gallium oxide have been developed (see, for example, JP-A-H07-39755 (Patent Literature 1), JP-A-H06-312138 (Patent Literature 2), and Applied Catalysis A: General, 38, 311-318 (1996) (Non-Patent Literature 1)). Further, JP-A-H10-309466 (Patent Literature 3) discloses a highly active catalyst which contains 0.3 to 0.9 wt% of silica derived from a colloidal silica or a water-dissolved silica and which is prepared by calcination

at 480 to 690°C.

[0007]

Because these catalysts are solid catalysts, the methanol synthesis reaction is generally carried out with a fixed-bed reactor. In general, the reactor may be a multitubular reactor. In general, the reaction mode may be batchwise. It will also be preferable to adopt a continuous reaction mode in which part or all of unreacted materials (including carbon dioxide and hydrogen) are recovered from the reaction mixture containing methanol formed, and the unreacted material components are circulated back to the material introduction step. In order to separate the reaction mixture into methanol and the unreacted gas, techniques such as distillation and separation with a gas-liquid separator are known.

Citation List

Patent Literatures

[0008]

Patent Literature 1: JP-A-1995-39755

Patent Literature 2: JP-A-1994-312138

Patent Literature 3: JP-A-1998-309466

Non-Patent Literature

[0009]

Non-Patent Literature 1: Applied Catalysis A: General, 38, 311-318 (1996)