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Influence of pH value on gel reaction for fluid flow pattern in a circular flow pipe. MASAKI YAMAGUCHI, Graduate school of science and technology, Keio University, TAKESHI YOKOMORI, TOSHIHISA UEDA, Department of mechanical engineering, Keio University — Influence of pH value for flow pattern and pressure variation with PVA–borax gel reaction in a circular flow pipe are experimentally investigated. The working fluids are 10 mass% polyvinyl alcohol (PVA) solution and 3 mass% borax solution. The pH value of borax solution is varied from 6.9 to 11.7 using sodium hydroxide (NaOH) or hydrogen chloride (HCl) solution. Three distinct flow patterns with gel reaction in a flow pipe are described at each pH value as, 1. Parallel flow, 2. Capsule flow and 3. Clogging. In the parallel flow, the injected borax is stretched by main flow velocity and it smoothly flows to downstream direction. The pressure is not varied since the gel reaction does not effect for flow pattern. In the capsule flow, the injected borax forms capsule shape and it flows to downstream region. The capsule is produced by gel sheet which is generated the interface between the injected borax and PVA solution. As a result, the injected borax is separated from PVA region. In clogging, injected borax forms fine finger shape product. Finally, injected material stays on the main flow pipe. The pressure cannot recover to the initial pressure because formed gel is adhered to the wall of main flow pipe. Thus, the pressure monotonically increases with time.

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