Review on rheology of complex fluids usable in kitchen earth science

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Some kinds of fluid,which are known as complex fluids in the field of soft matter physics exhibit peculiar behavior in many occasions. Because of this unexpected behavior these fluids have been widely used as an effective demonstration evangelist to represent fascinating nature of science. In spite of high popularity nature of this peculiar behavior has not been well understood and it is still hot subject under investigation. Overall rheology is tightly coupled with the internal structure, which evolves with time and deformation. This make the fluid complex.
In this presentation we review the rheology of various types of complex fluids, which can be used in demonstration experiments of kitchen earth science. We selected target fluids under the criteria below,
1. Safety. Safe to through into a waste box after the experiment without any special treatment. This is an important must in kitchen earth science. Hopefully not into a waste box but into our stomach is desirable.
2. Easy to prepare without any sophisticated device. This makes the experiments open to everybody.
3. Low cost. Although this is not chicken science but kitchen earth science, low cost is essential to start up experiments immediately.
The fluids we focus here are KELZAN,sodium arginate,thermogel,methyl cellulose,LUDOX and various kinds of yogurt. Some of these are used as a thickner in food additives. We will summarize rheological characteristics which significantly control the peculiar behaviors. Among rheological parameters yield stress plays most importsnt role in bifurcation of solid and liquid behavior. In complex fluids yield stress is not uniquely defined but exhibits maltivalued nature. This means the value depends on various environmental parameters. Coupled with the existence of yield stress negative dependence of flow stress with strain rate enhances local instability. Furthermore agening is an another important parameter. In the presentation we present various examples of curious bahaviors coupled with the rheology.

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