Candy as an analog of magma

Tohru Watanabe[1]

[1] Dept. Earth Sciences, Toyama Univ.

A good understanding of magmatic behaviors is required to understand volcanic phenomena. A large temperature difference is involved in various volcanic processes. High temperature magmas ascend through a cold country rock. They are further cooled at the surface by air and/or water. The change of magma properties associated with cooling and its influence on magmatic processes should play important roles in various volcanic processes. When it is cooled, a liquid with a complex structure like magmas does not crystallize but show a transition to glass. A glass is highly brittle. It hardly deforms plastically. Candy, which also has a complex structure, show brittle behaviors, when it is cooled.

Recipe
Pour sugar (70 g), starch syrup (30 g) and water (50 cc) into a pan, and mix them with warming.
(1) The viscosity decreases with increasing temperature.
(2) As degassing proceeds, the viscosity increases with decreasing water content.
(3) Stop heating when the viscosity becomes appropriate.
(4) The liquid shows a transition from a liquid to a glass when it is cooled.

Applications
(1) Deformation of bubbles: Deformed bubbles tend to become spheres by the influence of surface tension. The coalescence of bubbles is hardly observed.
(2) Pelees hair: Extend the liquid when it is hot. You can make thin strings of candy.
(3) Hyaroclastite: Pour a drop of the liquid into cold water. A glass crust is forming. Water invading through cracks in the crust vaporize to break the crust.