Egg – Coagulation

**Objective**

To investigate the effect of cooking and amount of liquid on coagulation of egg custard.

**Principles**

Proteins undergo a process known as denaturation when their secondary structure is altered but their primary structure is unchanged. The molecule unfolds and changes shape but the sequence of amino acids remains the same. Denaturation is brought about by various physical and chemical means and involves the breaking of the cross-linkages which maintain the shape of the molecule. It is usually irreversible, by being impossible to regain the origin structure of the molecule. As a result of denaturation the properties of the proteins alter, they become less soluble and more viscous. The unfolded molecules tend to bond with each other forming clumps. This results in the hardening or ‘setting’ of the protein food and is known as coagulation.

**Apparatus and Materials**

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| Apparatus | Materials |
| 6 heat proof bowls  Measuring jug  Weighing scale  Fork  Steamer | 6 large eggs  150 g sugar  600 ml water |

**Procedures**

1. In each bowl, beat 1 egg with 25g sugar lightly.
2. Add the liquid for each sample as indicated and mix well.
3. Steam over high heat for 15 and 20 minutes as indicated.
4. Observe and record the firmness of steamed egg custard.
5. Represent the firmness by using the number of “+”. (max 10 “+”)

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| Sample | Water | Cooking time | Firmness of steamed egg custard |
| 1 | 50 ml | 15 mins |  |
| 2 | 100 ml | 15 mins |  |
| 3 | 150 ml | 15 mins |  |
| 4 | 50 ml | 20 mins |  |
| 5 | 100 ml | 20 mins |  |
| 6 | 150 ml | 20 mins |  |

**Questions for further thoughts**

* If other ingredients such as sugar, acid, salt, milk or cream is added, will it affect the coagulation of egg? Why?
* Will whisking the egg mixture vigorously affect the coagulation?
* What are the applications of egg custard with different firmness?
* If other protein foods are cooked with different duration, what will happen? Why?