Figure 23.9 Examples of tempered chocolates.

- Obtain a tempered sample at the closest point to depositing into mould;
- Place into temper meter;
- As fat solidifies, it releases heat of crystallisation;
- The chocolate temper unit (CTU) ranges from 0 to 12, with 6 being a good level of temper:
  - As the readings go below 6, the product moves into the under-tempered side;
  - As the readings go above 6, the product moves into the over-tempered side;
- SLOPE scale: 0 is a good level of temper:
  - Perfect temper is a 0 slope – the amount of heat produced is balanced by the amount of heat being removed during the cooling and a plateau or zero slope is seen;
  - Negative readings indicate overtempered – crystallisation already occurred before taking the sample to the unit, less heat produced and insufficient heat could not cause a temperature rise;
  - Positive readings indicate undertempered – a lot of heat is released as the chocolate solidifies causing the temperature to rise (not enough stable crystals).

23.12 Shelf life of finished confections

All foods are perishable by nature. Numerous changes can take place in foods during storage and distribution. We would like to think that we do not change with age, but we know we all do and this is the same case with all foods. Conquering shelf life issues in confections can be challenging.

23.12.1 What is shelf life?

The shelf life of a food product is the period of time during which it will retain acceptable appearance, aroma, flavour and texture. Key elements of shelf life for the confectioner would be microbiological safety, formation of eutectics, fat and sugar bloom, migration (fat, ethanol or moisture), loss of texture and rancidity. Chocolate is very shelf stable due principally to the unique properties of cocoa and its low moisture content. As a result, most chocolate products can be classified as medium- or long-life products. When adding inclusions and making candies using chocolate, the shelf life can be altered and categorised into two main classes:

- Shelf life is inherent in the product itself and *cannot* be extended by packaging alone;
- Shelf life is dependent on the environment and *may* be controlled by proper packaging.

In a perfect world, making mouth-watering confections today and selling them tomorrow is ideal, but many factors influence how these candies get to our consumers, such as raw material availability, seasonality, distribution and consumer demand. Microbiological safety is critical in confectionery products. Raw nuts may contain pathogens therefore products must be processed and stored to prevent this. Milk may contain *Listeria*, making it critical to keep milk-containing products away from moisture and condensation. A raw material and finished product testing programme needs to be in place to monitor your environment and products going out the door. A hold/release programme will prevent any products from getting out of your control to guarantee product safety is not an issue.

23.12.2 Effect of formulation

The formulation chosen for a confection can directly impact how well the flavour and texture are maintained. Eutectics could form (see Chapter 7), decreasing shelf life and causing the product to bloom with the possibility of fat deterioration when incompatible fats are blended together in a formula. Cocoa butter and palm kernel oil are not compatible and will cause softening when just small amounts are mixed together. A general rule of thumb is do not mix more than 4% of other vegetable fat with cocoa butter when manufacturing a compound coating.

Everything likes to come to equilibrium – a balanced state or unchanging system.

Centres and coatings will exchange fats, moisture and ethanol altering the texture of both the filling and chocolate. Migration of nut oil may cause chocolate fat bloom. The migration of moisture and ethanol may cause sugar bloom. Consult your specialty fat supplier to formulate in the correct fat for your recipe. Milk fat is often added to dark chocolate to provide protection against bloom delaying transitions from form V to form VI (the highest melting polymorphic form). Keeping a meltaway smooth upon storage may require actual tempering