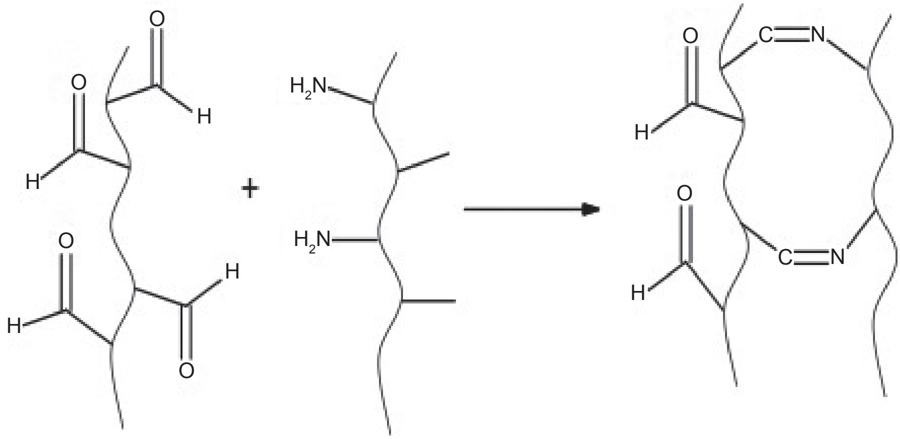

Fig. 5. Schematic representation of Schiff's base reaction.

Physically crosslinked hydrogels

Physical crosslinking hydrogels have different mechanism then chemically crosslinked hydrogels. By changing the intermolecular forces such as hydrogen bonding, hydrophobic interaction, electrostatic, ionic force, intermolecular assemblies such as guest-host inclusion, stereo-complexation and complementary binding. These changes can be induced by external stimuli such as heat, pH, temperature, light and electrical field (Qui et al. 1998). The advantages of these types of gels are to avoid toxic crosslinkers and catalysts to formulate injectable hydrogels. Also, one can design hydrogels with different mechanical strength, gelation time and rate of degradation.

Thermoresponsive hydrogels

In early generation physical crosslinked hydrogels, thermoresponsive hydrogels plays an important role. Temperature can induce a change in the solubility of a whole polymer network, thereby causing the sol-gel phase transition. The temperature at which phase transition occurs is called lower critical solution temperature (LCST) (Skrabania et al. 2007). This property is used to prepare *in situ* hydrogels, where polymer solution exists in liquid state below LCST and forms a solid gel at above LCST. Most of these gels are designed in such a way that the LCST is around or near body temperature (37ºC). Some of the most widely used non-biodegradable thermoresponsive gels synthesised using N-isopropylacrylamide (NIPAAm), Pluronics and various PEG-based polymers. Pluronics is a triblock copolymer composed of PEO and PPO (PEO-PPO-PEO), which exhibit sol-gel transition at physiological temperatures (Fig. 6). The composite consists of chondrocytes suspended in Pluronics resulted in a bone-cartilage interface for mandibular condylar reconstruction (Weng et al. 2001). The main advantages of Pluronics are mild gelation, good biocompatibility, increase the stability of encapsulated proteins, however, the low mechanical integrity, non-degradability, high permeability limits its biomedical application (Liu et al. 2007). Thermosensitive chitosan-Pluronic