

Creep Tests

Creep tests are shown in Figure 1. Strain was plotted against time at different temperatures. According to the Voigt model, the strain (γ) can be given by the following equation (1):

$$\gamma = (\sigma_0/E) (1 - \exp(-t/\lambda)) \quad \dots(1)$$

Where E is the Young's modulus of the material, σ_0 is the stress at $t = \infty$ and λ is the retardation time. The Arrhenius expression for temperature dependence of retardation time is given by:

$$1/\lambda = A \exp(-E_a/RT) \quad \dots(2)$$

Where A is a constant, T is temperature, R is the gas constant and E_a is the activation energy. The insert in figure 1 shows the Arrhenius plot used to calculate the activation energy of the process. The apparent activation energy obtained is 2.6 kcal/mol (10.6 kJ/mol)

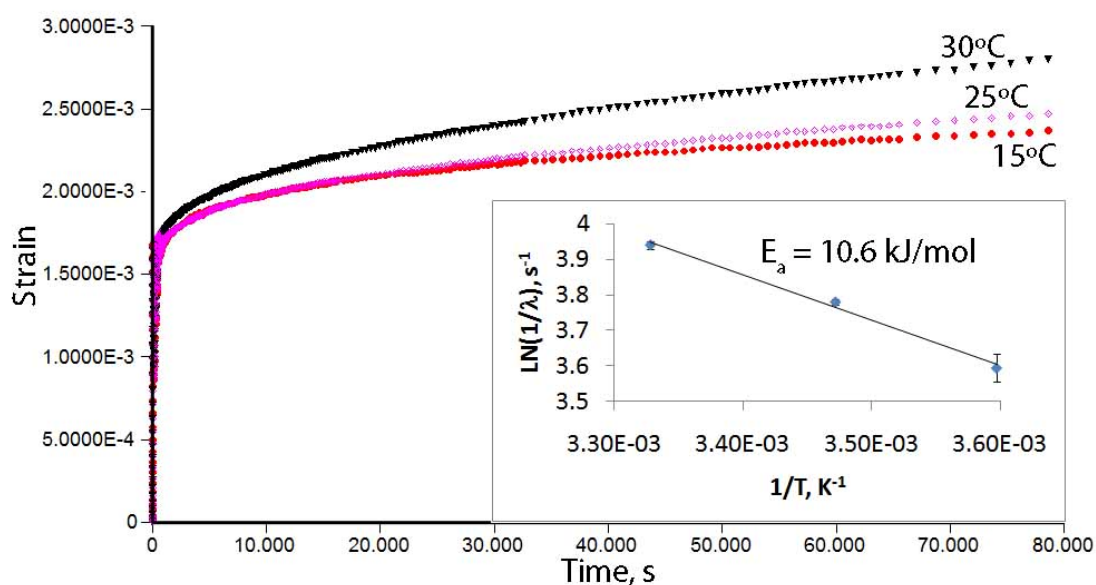


Figure 1. Representative creep test of BC gels. Creep tests were performed on BC gels at temperatures ranging 0-30 °C. A Voigt model was used to find the retardation time at each temperature. The Insert shows the Arrhenius plots of the retardation times of BC against the reciprocal of absolute temperature.