

Modeling of water absorption behaviour of black gram and dhal during soaking

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■ **ABSTRACT** : The hydration kinetics of black gram and black gram dhal was studied by soaking in water at temperatures of 30, 40, 50, 60 and 70°C in water bath up to 180 min during the year 2012-13. The amount of water absorbed was high at the early stage of hydration followed by a decreased rate. Peleg's equation adequately described the hydration characteristics of samples under the experimental condition ($R^2 = 0.95$). The Peleg's rate constant, k_1 , decreased from 4.80×10^{-2} to 1.17×10^{-2} for black gram and 3.11×10^{-2} to 0.77×10^{-2} for dhal. Peleg's capacity constant, k_2 , decreased from 1.32×10^{-2} to 0.393×10^{-2} from 30 to 50°C and then increased to 0.476×10^{-2} up to 70°C for black gram while k_2 for dhal was increased from 7.2×10^{-3} to 8.0×10^{-3} with an increase in temperature from 30 to 70°C, demonstrating that the water absorption rate increased and water absorption capacity decreased with increase in temperature. Both the Peleg's constants were expressed by a polynomial function ($R^2=0.9$) for relating to the temperature. The temperature dependence of $1/k_1$ followed an Arrhenius type relationship. The activation energy was 20.78 kJ/mol and 31.57 kJ/mol for black gram and dhal, respectively.

■ **KEY WORDS** : Blackgram, Dhal, Hydration, Peleg's equation, Modeling

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