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Data Article

Physicochemical data on aqueous polymeric systems of methyl cellulose and lambda- and kappa-carrageenan: SAXS, rheological, densitometry, and sound velocity measurements

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ABSTRACT

General as well as more specific physicochemical data obtained by studying the structure and various dynamical properties of aqueous polymer systems of methyl cellulose, λ–carrageenan, and κ–carrageenan are presented in graphical and numeric tabular form. The data provide basic polymer characterization info as also a specific structural and dynamical info for aqueous solutions of three industrially very important polymers (food additives) that are available commercially. The commercial availability has much bigger impact to applications, research and connected advances, when the basic substances are well characterized – a feature that is still missing for many commercially available polymers unfortunately.

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Specifications Table

Subject area	*Chemistry*
More specific subject area	*Physical Chemistry*
Type of data	*Figures, Data files*
How data was acquired	*Anton Paar density and sound velocity meter DSA 5000 (Prototype 5); Anton Paar Physica rheometer UDS 200, Anton Paar Physica MCR 302; In-lab modified Anton Paar "Old-Kratky" SAXS camera.*
Data format	*Raw and/or reduced data*
Experimental factors	*The polymer samples were used as purchased. They were dispersed in water by vigorous stirring at approximately 70 °C and then left to cool-down and rest overnight in the fridge at 4 °C.*
Experimental features	*Temperature dependencies of the measured properties were obtained in a step-wise manner, where the samples were left to equilibrate at a specific temperature for a certain time before an individual measurement.*
Data source location	*Ljubljana, Slovenia, Europe.*
Data accessibility	*Data is with this article. The numerical raw data files are provided in the Data in Brief DataVerse*, http://dx.doi.org/10.7910/DVN/ZOE59W.

Value of the data

(1) These data represent a comprehensive data set on basic physicochemical and structural characterization of three industrially important polysaccharides that are commercially available. They should be of interest to the researchers using these polymers in their investigations to avoid the need of repetition of basic polymer characterization.
(2) The temperature dependent dynamic viscosity data reveal the transition temperatures and viscosity-change information of the gelling/de-gelling transitions that allow easier selection of the temperature regimes for further investigation and/or possible application of these and related systems.
(3) These specific SAXS data have already been evaluated by the classic and the string-of-beads model and, as here presented in a numerical tabular form they enable an interested researcher to use them for benchmarking of performance of other developed evaluation models or models in development.

1. Data

The data shown in this article are related to our recent structural study of aqueous polymer systems of methyl cellulose (MC), λ–carrageenan (LC), and κ–carrageenan (KC) utilizing the small-angle scattering (SAXS) study by the string-of-beads model [1] and on a general level in part also to some of our previous studies [2–8]. Some of them represent the basic polymer characterization and the others contain additional information on practically very important dynamic and structural properties of these systems.

In Fig. 1 we show the experimental temperature dependent density values, ρ, of 0.5, 1, 2, and 4 wt% MC, LC, and KC aqueous solutions and in Fig. 2 the corresponding experimental sound velocity data, v_s. According to the following expression:

$$\beta_S = \frac{1}{\rho \cdot v_s^2} \tag{1}$$