



ZESPÓŁ HAL TECHNOLOGICZNYCH

Nazwa aparatu: Wiskozymetr rotacyjny Bohlin Visco 88

Zakres warunków operacyjnych : wiskozymetr Bohlin Visco 88 to uniwersalne przenośne urządzenie do pomiarów lepkości dynamicznej, urządzenie wyposażone w moduł sterujący oraz zestaw cylindrów pomiarowych: wewnętrzny \varnothing 25 mm oraz zewnętrznych \varnothing 33 mm i \varnothing 27,5 mm. Zakres termostatowania próbki: -20°C do +75°C. Parametry oznaczane: lepkość dynamiczna [Pas], naprężenie ścinające [Pa]. Zakres oznaczalności lepkości: 20,0 – 0,001 Pas.

Parametry pracy wiskozymetru:

SYSTEM	Cylinder wewnętrzny	Cylinder zewnętrzny	Zgodność z	Pojemność badanej próbki
2	25 mm	27,5 mm	C25 DIN53019	15 ml
5	25 mm	-	-	
8	25 mm	33,0 mm	-	32 ml

Tabela 1: Systemy pomiarowe

Prędkość	Obroty [rpm]	Prędkość [Hz]
1	20	0,33
2	35	0,58
3	61	1,02
4	107	1,78
5	187	3,12
6	327	5,45
7	572	9,53
8	1000	16,67

Tabela 2: Prędkości pracy wiskozymetru

Zastosowania: oznaczanie lepkości dynamicznej, kontrola jakości surowca, dobór parametrów dla procesów transportu w instalacji, oznaczenie prędkości ścinania na wartości lepkości

Branże, dziedziny: farby, lakiery, kosmetyka, farmacja, spożywcze, budowlane

Przykład 1: określenie lepkości farby w funkcji siły ścinającej przy stałej temperaturze

Przykład 2: określenie lepkości substancji spożywczej w różnych temperaturach (warunki magazynowania) dla określenia optymalnych parametrów transportu

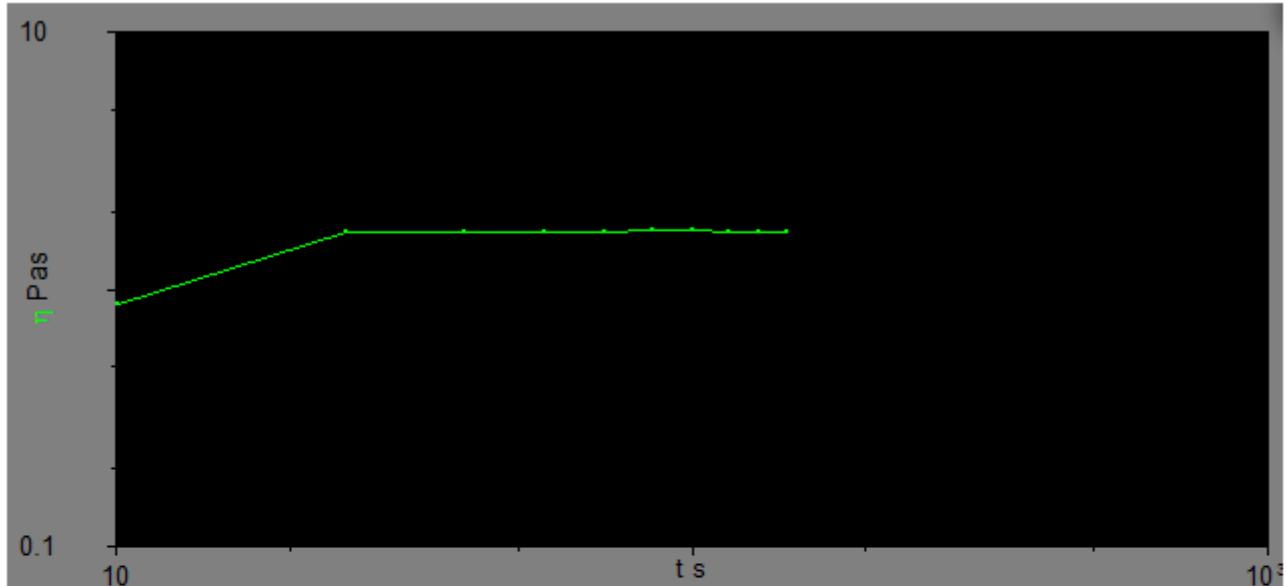
Przykład 3: określenie lepkości 3 partii substancji przy stałej prędkości ścinania i w stałej temperaturze w celu

Zdjęcia:



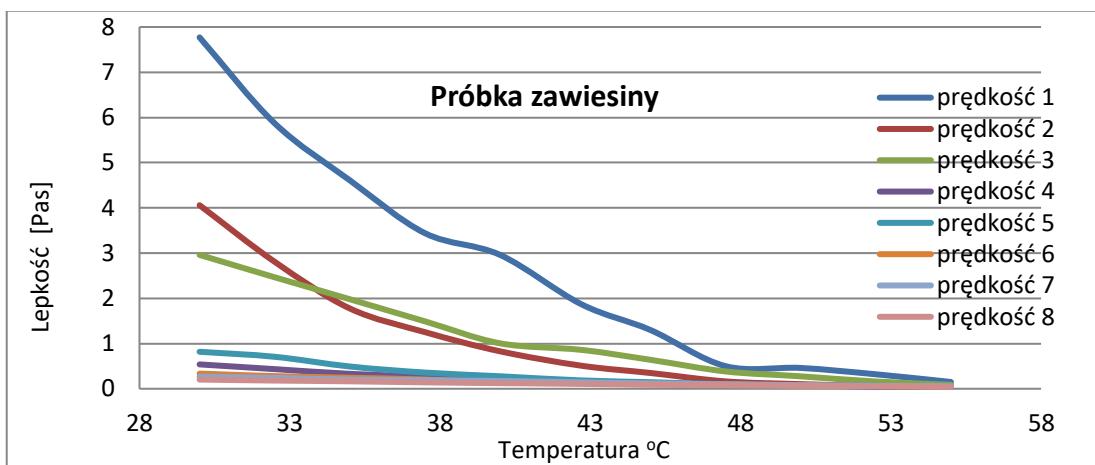
Przykładowe pomiary:

- I. Oznaczenie lepkości, wyniki generowane automatycznie przez aparat, próbka – ogólnie dostępne mydło w płynie



Time t s	Temperature T °C	Shear Rate ̳ 1/s	Shear Stress σ Pa	Viscosity η Pas	Percentage Ra % range	Accumulated T t acc s
10.1090	22.4	14.9121	12.8161	0.859442	4.7	10.1090
25.2730	22.4	15.2994	25.495	1.6664	9.4	25.2730
40.4360	22.4	15.3102	25.4476	1.66214	9.4	40.4360
55.5990	22.4	15.2983	25.4646	1.66454	9.4	55.5990
70.7620	22.4	15.3119	25.5198	1.66589	9.4	70.7620
85.9260	22.4	15.2781	25.5257	1.67074	9.4	85.9260
101.0890	22.4	15.2997	25.5155	1.66771	9.4	101.0890
116.2520	22.4	15.2861	25.4353	1.66395	9.4	116.2520
131.4160	22.4	15.3664	25.4748	1.65783	9.4	131.4160
146.5790	22.4	15.3701	25.454	1.65607	9.4	146.5790

II. Lepkość zawiesiny w zależności od prędkości ścinania



Publikacje:

1. Libor Severa ; Josef Los „On the influence of temperature on dynamic viscosity of dark beer”
Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 01 January 2008, Vol.56(2), pp.303-308
Temperature dependence of dark beer dynamic viscosity have been evaluated. The beer samples have been tested in the wide range of temperatures (from 2 to 90 °C) by means of rotary viscometer. The dynamic viscosity ranged from 3.91 to 1.01 mPa. Arrhenius equation have been used to model experimental data with satisfying match R² = 0.993. Heat gradient in the gap of measuring cell have been described and evaluated.

2. Adamczyk, Zbigniew ; Cichocki, Bogdan ; Ekiel-Jeżewska, Maria L. ; Słowińska, Agnieszka ; Wajnryb, Eligiusz ; Wasilewska, Monika „Fibrinogen conformations and charge in electrolyte solutions derived from DLS and dynamic viscosity measurements”

Journal of Colloid And Interface Science, 1 November 2012, Vol.385(1), pp.244-257

Graphical abstract Highlights► A bead model of the fibrinogen molecule was developed. ► Presence of flexible arms was considered. ► Calculations of hydrodynamic characteristics of the molecule were performed. ► The model proved adequate for interpretation of various experimental data. ► Anisotropic charge distribution over the fibrinogen molecule was predicted. Hydrodynamic properties of fibrinogen molecules were theoretically calculated. Their shape was approximated by the bead model, considering the presence of flexible side chains of various length and orientation relative to the main body of the molecule. Using the bead model, and the precise many-multipole method of solving the Stokes equations, the mobility coefficients for the fibrinogen molecule were calculated for arbitrary orientations of the arms whose length was varied between 12 and 18nm. Orientation averaged hydrodynamic radii and intrinsic viscosities were also calculated by considering interactions between the side arms and the core of the fibrinogen molecule. Whereas the hydrodynamic radii changed little with the interaction magnitude, the intrinsic viscosity exhibited considerable variation from 30 to 60 for attractive and repulsive interactions, respectively. These theoretical results were used for the interpretation of experimental data derived from sedimentation and diffusion coefficient measurements as well as dynamic viscosity measurements. Optimum dimensions of the fibrinogen molecule derived in this way were the following: the contour length 84.7nm, the side arm length 18nm, and the total volume 470nm³, which gives 16% hydration (by volume). Our calculations enabled one to distinguish various conformational states of the fibrinogen molecule, especially the expanded conformation, prevailing for pH<4 and lower ionic strength, characterized by high intrinsic viscosity of 50 and the hydrodynamic radius of 10.6nm. On the other hand, for the physiological condition, that is, pH=7.4 and the ionic strength of 0.15M NaCl, the semi-collapsed conformation dominates. It is characterized by the average angle equal to <φ>=55°, intrinsic viscosity of 35, and the hydrodynamic radius of 10nm. Additionally, the interaction energy between the arms and the body of the molecule was predicted to be -4kT units, confirming that they are oppositely charged than the central nodule. Results obtained in our work confirm an essential role of the side chains responsible for a highly anisotropic charge distribution in the fibrinogen molecule. These finding can be exploited to explain anomalous adsorption of fibrinogen on various surfaces.