

also possible during sintering. It is accompanied by a kinetic phenomenon of increased excess vacancy concentration near the melting point. Thus negative shrinkage¹¹ is also a consequence of recrystallization. The decrease in intensity at 1273 K, must be due to the vacancy concentration by recrystallization, which is favoured by the reduction in surface energy at temperatures a little below the melting point.

The authors thank Prof. Anwar-ur-Rahman, and Prof. K. Rama Reddy, for encouragement and valuable suggestions.

11 July 1986; Revised 10 October 1988

1. Dedrick, J. K. and Gerds, A. J., *J. Appl. Phys.*, 1949, 20, 1042.
2. Kingery, W. D. and Berg, M., *J. Appl. Phys.*, 1955, 20, 1205.
3. Akechi, K. and Hara, Z., *Sintering and New Development*, M. M. Ristic, Elsevier, Amsterdam, 1979.
4. Eadie, R. L., Wilkinson, D. S. and Weatherly, G. G., *Acta Metall.*, 1974, 22, 1185.
5. Masuda, Y. and Watanabe, R., *Sci. Sinter.*, 1981, 13, 117.
6. German, R. M. and Munir, Z. A., *Material Science Research*, Vol. 10, Proceedings of the 4th International Conference on Sintering and Related Phenomena, (ed.) G. C. Kuczynski, Plenum Press, New York and London, 1975, p. 259.
7. Eadie, R. L. and Weatherly, G. C., *Material Science Research*, Vol. 10, Proceedings of the 4th International Conference on Sintering and Related Phenomena, (ed.) G. C. Kuczynski, Plenum Press, New York and London, 1975, p. 239.
8. Nyce, A. C. and Shafer, W. M., *Int. J. Powder Metall.*, 1972, 8, 171.
9. Slesar, M., Besterci, M. and Dudrova, E., *Sci. Sinter.*, 1982, 14, 21.
10. Novikov, V. I., Trusov, L. I., Lapovok, V. N. and Geleshvili, T. P., *Proshkov. Metall.*, 1983, 7, 39 (translated).
11. Achari, K. M. R., Reddy, M. B. and Ramachander R. B., *J. Mater. Sci.*, 1988, 23, 1673.

A NEW APPARATUS FOR THE DETERMINATION OF GEL STRENGTH OF PHYCOCOLLOIDS

V. VYJAYANTHI and R. RENGASAMY

Centre of Advanced Study in Botany, University of Madras, Madras 600 025, India.

THE quality of phycocolloids such as agar agar and carrageenan is usually determined by their gel strength^{1,2}. The methods of Nikan Sui and Rower Bal for measuring gel strength are basic controls in the agar market, yet they are not mentioned in the Pharmacopoeias, National Formulary, Codex, or other similar publications or specifications and analytical methods referring to phycocolloids². The principle involved in the determination of gel strength is based on measuring the load (g cm^{-2}) that causes a standard gel (1.5%) to break within a few seconds. In the present attempt a new design for the determination of gel strength has been presented.

A funnel with a basal area of 0.31 cm^2 is attached to a string which is passed over a single fixed pulley. The other end of the string is attached to a weight w . The initial weight of the funnel is p . The weight w should be equal to p . The funnel when initially made to rest on the gel can be considered to be of 'zero' weight as the initial weight p is neutralized by the weight w at the other end of the string (figure 1).

A hot 100 ml of 1.5% solution of phycocolloid was prepared with glass-distilled water and poured into a 500 ml beaker and kept for 24 h at room temperature. The gel was placed under the instrument and the funnel was allowed to rest over the gel. Lead shots were slowly added to the funnel without any disturbance. At a particular weight when the gel was broken, the lead shots were removed and weighed. This weight was divided by the basal area 0.31 cm^2 and expressed as gel strength in g cm^{-2} .

In any ideal machine, the efficiency is equal to unity.

$$\text{Efficiency} = \frac{\text{Mechanical advantage}}{\text{Velocity ratio}}$$

In a simple machine, when the power p just balances the load w , the ratio of the load to the power is called the mechanical advantage, i.e. w/p . In this mechanism the mechanical advantage is unity as w should be equal to p initially.

Let the initial length of the string resting on the gel be L_1 and the length with weight w be L_2 . After the breaking of the gel, the length of the string on



Figure 1. Set-up for gel strength measurement.

the gel is L_3 and the length of string with weight w is L_4 . Now,

$$\begin{aligned} L_3 - L_1 &= x \\ L_2 - L_4 &= y. \end{aligned}$$

Velocity ratio = x/y , i.e. velocity ratio is equal to unity as the increase in length x is equal to the decrease in length y .

Efficiency in this instrument is unity since

$$\begin{aligned} \text{Efficiency} &= \frac{\text{Mechanical advantage}}{\text{Velocity ratio}} \\ &= 1/1 = 1. \end{aligned}$$

The gel strength of agar sample at 1.5% concentration in glass-distilled water was determined by a

Nikan Sui type instrument made by Kiya Seisakusho Ltd, Japan, at the Central Salt and Marine Chemicals Research Institute, Bhavnagar, and was found to be identical with that measured using the instrument devised by us.

The authors thank Prof. V. Krishnamurthy for critical suggestions and Prof. V. N. Raja Rao and Dr N. Anand for reading the manuscript. We also thank the Director and Dr V. D. Chauhan, CSMCRI, Bhavnagar, for helping to standardize the instrument.

4 June 1988

1. Doshi, Y. A., Raju, P. V. and Sreenivasa Rao, P., *Sci. Cult.*, 1968, 34, 493.
2. Armisen, R. and Galatas, F., *Production and Utilization of Products from Commercial Seaweeds*, FAO, UN, 1987, p. 1.

PHOTOCHROMIC ACTIVITY OF 4-HYDROXY-BENZYLIDENESALICYLOYLHYDRAZINE

M. S. M. RAWAT*, S. MAL** and G. PANT
Department of Chemistry, University of Garhwal, Srinagar (Garhwal) 246 174, India.

**Oil and Natural Gas Commission, Basudhara, Bombay 400 051, India.

VARIOUS types of organic compounds have been investigated for photochromic activity. Generally this phenomenon occurs owing to the structural isomerism with the effect of radiation¹⁻². Cohen *et al.*³⁻⁵ considered that the presence of the *ortho* hydroxy group is an essential condition for coloration in *N*-salicylideneanilines and interpreted photochromism as an intrinsic property of the individual anil molecule. Benzenesulphonylhydrazines are photochromic in rigid matrices at low temperature⁶. Arylidene hydrazides, which are structurally similar to benzenesulphonylhydrazines; are potentially photochromic. An attempt was therefore, made to prepare arylidene hydrazides and investigate their photochromic activity. These hydrazine derivatives were prepared by condensation of the appropriate acid hydrazide (prepared by refluxing hydrazine

*For correspondence.