

aqueous solutions of six salts and also sucrose and urea at 25°. The Ostwald type viscometer was of quartz, internally ground and polished, and the transit of the meniscus was timed automatically by means of a photoelectric cell. The viscosities confirm the prediction made by Jones and Dole on the basis of the Debye theory of interionic attraction that all salts will increase the viscosity of water if measured at sufficiently low concentration. This is the case even for those salts which produce a diminution in viscosity at higher concentrations, including potassium chloride, chlorate and nitrate, ammonium chloride and caesium nitrate. The viscosity-concentration curves for these salts go through a minimum. Jones and Dole had shown that the fluidity of a salt solution should be related to the concentration by an equation of the form $\phi = 1 + A\sqrt{c} + Bc$, where A and B are constants. A should be negative for all electrolytes but zero for non-electrolytes, whilst B may be either positive or negative. This equation, based on the Debye-Hückel theory, is found to hold, and the results also confirm the equation of Falkenhagen and Vernon, in which the value of the constant A is calculated in terms of the mobilities of the two ions. In the case of the two non-electrolytes, the square root term was absent, as it should be when no ions are present in the solution.

Oxidation and the Lubricating Properties of Oil. In a paper in the *Proceedings of the Royal Society* for February, R. O. King describes experiments on lubrication by oil in a state of strong oxidation. A blended mineral oil was circulated through a journal bearing, the temperature of the bearing was artificially raised by a gas-burner, and the the oxidation of the oil was promoted by blowing air through the hot oil. It was found that as the trial of a sample of oil proceeded, the viscosity increased slightly, but the bearing friction at high temperatures decreased and the temperature of seizing was pushed up to very high values. In one case, for example, the coefficient of friction had the very low value of 0.00045 with the bearing running at about 250°. The lubrication of a bearing of this kind under ordinary conditions is of the 'fluid friction' type, but the friction observed under the oxidation conditions is too low to be explained in this way, and the author suggests that the 'oxidation lubrication' is of a quite different type in which activated molecules formed in the initial stages of oxidation become attached to the surfaces and build up a boundary layer. The conditions are then something like those of 'boundary lubrication' described by Hardy but the special nature of the activated molecular film permits a surface of very free slip to be formed.

Astronomical Topics

Astronomical Notes for April. Mercury is in elongation as a morning star on April 20, but is not well placed for northern observers. Jupiter and Mars continue to be well placed, in Leo. Mars is stationary on April 13, not far from Regulus; after this it will approach Jupiter until the evening of June 4, when they are only 15' apart. Neptune is also in Leo. Venus and Uranus are too near the sun for observation; the former becomes an evening star on April 21, but will not be easily observable until June.

An occultation of Regulus is visible in the southern portion of England on the evening of April 6; the northern limit runs roughly from Liverpool to Dover. Many observers are making expeditions to the limiting line, in the hope of locating this with precision. At Greenwich, disappearance occurs at 8.57 p.m., and reappearance at 9.10 p.m., 24° east of the north point. The smallest instrument will suffice for the observation. Other disappearances of faint stars occur in London on April 1 at 10.10 p.m., on April 29 at 10.42 p.m. and on April 30 at 11.30 p.m. Minima of Algol occur on April 1 at 11.40 p.m. and on April 4 at 8.30 p.m.

Comet Pons-Winnecke should be visible with moderate instruments at the end of April and in May. Search ephemerides are given in B.A.A. Handbook for 1933.

Summer time begins on the morning of April 9, a week earlier than usual, owing to the third Sunday being Easter. Summer time is not used in these notes, and should not be used for astronomical records. After April 9, the times given here need to be increased by one hour to give the summer time.

The Minor Planet Amor. This is the interesting planet discovered by M. Delporte at Uccle a year ago, when it approached the earth within ten million miles. It was observed for nearly three months;

Astronomische Nachrichten No. 5936 contains a careful discussion of its orbit by Dr. A. Kahrstedt of the Berlin Rechen-Institut.

Epoch 1932 April 6.0 Greenwich Time; mean anomaly 0.45458°; arc from node to perihelion 25.24671°, node 171.13239°, inclination 11.93816°, eccentricity 0.4358886, mean daily motion 1329.6154", semi-major-axis 1.9239201, period 974.718 days. It is pointed out that the period is to that of the earth as 8 to 3, so that 8 years bring about a recurrence of favourable conditions. Search ephemerides are given for the spring months of 1916 and 1924, in the hope that a re-examination of plates exposed then may disclose some images of the planet; these would be of great use in improving the orbit determination, and facilitating the recovery of the planet. Its motion when near the earth is so rapid that the long trails on plates might have been taken for those of meteors.

Since the least distance of this planet is only two thirds of that of Eros, it may be used for determining the solar parallax and the mass of the moon, as soon as its orbit is accurately known.

Measures of Double Stars at the Union Observatory, Johannesburg. Bulletin 241 of the Astronomical Institute of the Netherlands contains further instalments of the systematic survey of the southern heavens for double stars, which is being carried out by W. H. van den Bos with the 26-inch refractor at the Union Observatory. Accurate measures are given for 158 stars; a considerably longer list contains estimates of positions and magnitudes; in about half the stars of the first list the separation is less than 1", and several are so small as 0.1". In four cases, closer companions of previously known pairs have been detected. The primaries are nearly all in the Bonn or Cape Durchmusterung, their reference numbers in these being given.