

by a piston loaded with weights. The results are given in tables, the temperature in International Centigrade degrees, the pressure in centibars, and in standard atmospheres and kilograms per square cm. for gravity 980.665. An additional table gives the temperature in Fahrenheit degrees and the pressure in lb. per sq. in. for gravity 32.174. Rates of change of pressure with temperature are also tabulated for thermodynamical purposes. None of the usual formulæ gives the pressure correctly over the whole range of temperature and the authors use a five constant formula with different constants for the ranges 100°–275° C. and 275°–374° C.

Reaction between Hydrogen and Oxygen. Hinshelwood, Moelwyn Hughes and Rolfe (*Proc. Roy. Soc.*, March) have studied the reaction between hydrogen and oxygen in a hot silver vessel. At a temperature of 650° the reaction remained fairly slow, though in a silica vessel at this temperature it would be unmeasurably fast. The explosions which occur for the silica vessel when the pressure lies within a certain range were not obtained with the silver vessel. The reaction always showed behaviour characteristic of a pure surface reaction, and the authors conclude that the silver surface has a powerful effect in breaking reaction chains which are the mechanism of a rapid reaction in the gas phase.

Study of α -Particle Groups. A recent paper from the Cavendish Laboratory deals with the analysis of α -particles by an electromagnet of new design (*Proc. Roy. Soc.*, March). The magnet consists of two bell-shaped pole pieces with a central core carrying the windings. The bells are placed mouth to mouth and an annular region of strong magnetic field is formed between their edges. A field of 10,000 gauss may be produced over an annular region 80 cm. in diameter, 5 cm. wide and 1 cm. deep with an energy of only 200 watts, and α -rays may be analysed by semi-circular focusing as in familiar β -ray apparatus. The source is placed in the annular gap, and diametrically opposite there is a small ionisation chamber connected to a valve amplifier and counting system. Successive groups of α -particles are focused on to the slit of this chamber by adjusting the magnetic field. An arrangement of search coils, fluxmeter and compensating circuit is used to measure the changes in the field. The results obtained are comparable with those obtained by Rosenblum using the great Paris magnet. The fine structure of the α -rays from thorium C is revealed, and the long-range α -particles from radium C¹ and thorium C¹ can be studied. The interest of the investigations lies largely in the relation between α -ray and γ -ray energies, and in some cases satisfactory correlations have already been made between the quantum energies of γ -rays and the energy differences between α -particle groups.

Astronomical Topics

Astronomical Notes for May. Venus is an evening star, but too near the sun for convenient observation. Mars and Jupiter are approaching each other in Leo, but do not reach conjunction until June 4. Mars is 47' north of Neptune at 8 p.m. on May 16; this may aid observers without circles in identifying Neptune. Saturn, in the eastern part of Capricornus, may be seen after midnight; it is still too far south for convenient observation in England.

The times of disappearance, as seen from London, of four stars occulted by the moon are May 3, 10.31 p.m.; May 5, 8.57 p.m.; May 30, 10.21 p.m.; May 31, 10.17 p.m.; the magnitudes are 6.7, 5.5, 6.2, 7.0.

Two comets are within reach of moderate instruments. Comet Geddes is in Canes Venatici; an ephemeris is given in the B.A.A. Handbook. Comet Pons-Winnecke is in Aquarius; the following ephemeris is for 0^h on the days named:

	R.A.			Decl.		
May 4	20 ^h	56 ^m	16 ^s	N.	1°	48'
8	21	17	20	N.	0	25
12	21	36	44	S.	1	1
16	21	56	32	S.	2	28
20	22	15	46	S.	3	55

It is in perihelion on May 18, at a distance from the sun of 102 million miles; this distance has increased by 6 million miles during the last revolution, owing to large perturbations by Jupiter.

To reduce to Summer Time, add one hour to all times given.

Faint Stars with Common Proper Motion. W. J. Luyten has recently published a paper describing a research that he has made with a blink microscope of plates of the region within 30° of the south pole (*Mon. Not. Roy. Astro. Soc.*, Jan.). It contains a list of stars which are concluded to be physically connected from the fact that they have common proper motions of

considerable size. The paper attempts to find the probable distances and masses of the stars from a careful statistical study. There are seventy-three pairs which may be confidently taken as physically connected; a few of these had been already announced by other observers.

Two of the new pairs appear to show appreciable orbital motion in the interval of twenty-nine years between the plates; their periods are roughly estimated as 2½–3 centuries, and their parallaxes as about 0.1" (deduced statistically, not by measurement). Both appear to be dwarf pairs, of the type of Kruger 60; they would repay visual measures with large instruments.

New Proper Motions of Stars from Bergedorf Observatory. Band 7, No. 37 of the *Bergedorf Mitteilungen* contains the seventh instalment of the "Eigenbewegungs-Lexicon". There are 3,757 new proper motions of stars (mostly faint) in the hours 4 and 5 of right ascension. Altogether 45,204 proper motions have now been published in this series. The present list has been compiled by C. Vick under the direction of Prof. R. Schorr. The declinations of the stars lie between 90° North and 1° South; they are arranged in degrees of declination, the reference numbers of the Bonn Durchmusterung being given.

For nearly all the stars observations in the present century are available; the dates of the latest observations for each star are given. Reference is made to the "Geschichte des Fixsternhimmels" for the early observations; the proper motion lists are designed to be used in conjunction with the "Geschichte". They give the magnitudes, the number of observations used for each star, and the proper motion in R.A. and declination in 100 years. No stars with less than three observations are included; generally there are four or five.