finds the position of these bands to be consistently nearer to the red end of the spectrum. The difference in the position of the bands in the spectrum of benzene vapour and of benzene in solution only proves, of course, the applicability of Kundt's rule. We are also pleased that Prof. Hartley has been able to see the second band on our list ($\lambda = 2656$), which, coupled with the fact that Friederichs has also measured it, we feel is a most important confirmation of our observations.

As regards the eighth band ($\lambda = 2330$) which has been measured in the absorption spectrum of benzene vapour by Friederichs (whose work we were, of course, unaware of when we wrote our paper), we have made a most careful search for it. We have re-examined our original plates and have taken several more photographs, but have been unable to find any trace of it. We must therefore conclude that it is absent from the spectrum of benzene in alcoholic solution.

There is one other point in Prof. Hartley's letter; he says we have overlooked some points of importance in his paper with Prof. Dobbie when we state that they only found six bands. It is quite true that in their paper Hartley and Dobbie refer in their table of measurements to another band of very short persistence which they mark as doubtful at 5 mm. thickness of N/10 solution, and very doubtful at 4 mm. thickness. In the letterpress, however, they speak of only *six* bands, and in all later publications benzene is stated to show six absorption bands. In the British Association report, and even in Prof. Hartley's paper to the Chemical Society on May 17 of this year, he speaks of six bands (*Chem. Soc. Proc.*, xxi., 167). We therefore assumed that Prof. Hartley, on further consideration, had concluded that this doubtful band was not a true benzene absorption band. As we ourselves had seen no trace of this band, we in our paper before the Chemical Society (*Trans. Chem. Soc.*, lxxxvii., 1332) stated that Hartley and Dobbie had found only six bands.

Prof. Hartley's ideas and work upon the absorption spectra of organic compounds in the ultra-violet are of the greatest importance; he was the first to show how the constitution of certain compounds could be established by this means. Prof. Hartley's method of "testing" a molecule by means of its absorption spectrum, we are sure, will prove of the greatest possible value in the hands of chemists.

E. C. C. BALY.
J. NORMAN COLLIE.

University College, October 12.

Action of Radium Salts on Gelatin.

HAVING occasion to give a demonstration of the properties of radium some little time ago, I determined to attempt the preparation of some of the organisms as described by Mr. J. Butler Burke.

The method employed was to sprinkle a few specks of the radium salt upon the surface of some sterilised gelatin contained in a test-tube, and then to await development. That did not take long. Almost at once a faint cloudiness appeared to start under the speck of salt which extended downwards into the gelatin, in some cases after twenty-four hours reaching the depth of one centimetre. No heating was required to bring about this "growth," which resembled to the unaided eye an ordinary mould. The experiment was made with radium preparation of varying degrees of activity, but it was soon observed that the degree of activity in the salt had little influence on the growth, a salt of radium barium bromide containing 1/1000 of its weight of active salt being nearly as efficacious as one containing 1/100. (The more pure specimens which I possess were too precious to experiment with.)

As the specimens used were composed chiefly of barium salt, it occurred to me that it might be interesting to try the effect of the pure barium salts on the gelatin. This was done, with the surprising result that the "growths" were just as easily obtained as with the radium preparation—or even more so. I have tested all the barium salts at my disposal, and find the following produce the effect:—Barium, oxide, dioxide, chloride, bromide, iodide, nitrate, acetate, tartrate, and sulphovinate, while the phosphate, carbonate, sulphate, and borate do not act. Thus the soluble salts are active, and the insoluble ones inactive.

The method adopted for the experiments was as follows:—Some clear gelatin was poured on to a glass slip and allowed to set. A tiny speck of the salt was placed on the gelatin and covered with a thin glass. This slip was then placed on the stage of a microscope and examined with a ½-inch power. At once the "growth" was seen to shoot out from the speck, and it appeared to consist of bubbles, some large, but most of them very small. Half an hour afterwards the speck had dissolved, leaving in its place a nebulous patch many times the size of the speck. The action of barium iodide is particularly rapid, while that of the hydrate is rather slow. I have tried uranium and thorium salts, both of which affect the gelatin rapidly, but do not produce the "growths." The action of these salts upon gelatin seems to point out an interesting field of inquiry, which I propose to follow.

W. A. DOUGLAS RUDGE.

Woodbridge School, Suffolk.

The Problem of "Shadow-bands."

SUBSEQUENTLY to the Algiers eclipse of 1900, it occurred to me that the "shadow-bands" visible at times of total solar eclipse might be merely another aspect of the "boiling" distortions of the sun's limb inseparable from daily observations. The last few years have therefore been employed by me in studying the characteristics of "boiling" with the view of making a direct comparison of evidences at the first opportunity. This opportunity presented itself in the recent total solar eclipse observed by me at Cás Catalá, in Mallorca, on August 30 last.

Employing "Carrington's method" of projecting the sun's image with a small telescope, the first observation made at about 10 a.m. recorded the existence of two distinct layers of cloud, the lower one travelling N.E. by S.W., and the upper one W.S.W. by E.S.E., giving confused and erratic "boiling." Further observations revealed an increased prevalence of the N.E. cloud system, but the drift from W.S.W. was still in evidence. At 11.35, however, it transpired that the W.S.W. system alone prevailed, and all trace of the drift from N.E. had abated. Continuing the observation without any relaxation throughout the phase of partial eclipse until within a few minutes of totality, I was able to ascertain that the "boiling" movements along the advancing limb of the moon were throughout absolutely in agreement in every particular with the movements of distortion affecting the still uncovered limb of the sun. Observations by projection were abandoned at 1h. 18·0m. for the purpose of securing a naked-eye view of "shadow-bands." A very successful view of these was secured. Their direction of flight determined on the spot, and afterwards corrected by Dr. Hunter, of Edinburgh, by the compass, proved to be W.S.W. by E.S.E. It is noteworthy that at Palma, where the eclipse conditions were marred throughout by the cloud bank that had threatened to overwhelm us at Cás Catalá (only four miles S.W. of Palma), the "shadow-bands" were observed to take a direction N. 30° E. by S. 45° W.

CATHARINE O. STEVENS.

Bradfield, Berks, October 20.

Rhymes on the Value of π.

Now I know a spell unfailing,
3 1 4 1 5 9
An artful charm, for tasks availing,
2 6 5 3 5 8
Intricate results entailing.—
9 7 9
Not in too exacting mood,
3 2 3 8 4
(Poetry is pretty good),
6 2 6 4
Try the talisman.—Let be
3 3 8 3 2
Adverse ingenuity!
7 9

π.