junction with the Carnegie Institution's Mt. Wilson Observatory.

We must be satisfied with surface temperatures, Prof. Russell explains, because we can look into a star only through a small mass of its atmosphere. If our atmosphere were as opaque as the hot atmosphere of a star we could see only a few feet in it. The opacity is due largely to the abundance of free electrons and ions which are partly separated from each other on account of the high temperatures. The extent of this so-called ionization can be calculated according to the law of mass action which has proved so powerful in studying chemical reactions.

The extent of the ionization also determines the character of the spectrum. Prof. Russell described how certain lines in the spectrum at first became stronger as the temperature increased and then became weaker again. By studying the relative strength of many lines he tells how hot a star is. By this method he expresses in degrees the temperatures of many stars which have previously been classified only as to color.

Using this information, Prof. Russell is able to determine the relative abundance of different elements in the stars. It turns out that hydrogen, for example, is usually a thousand times more abundant than all the metals put together.

Science News Letter, December 9, 1933

METEOROLOGY

Trees Protected By Lightning Rods

PROTECTION against lightning has been given to a number of fine trees in Maryland, some of them of historic interest, by equipping them with lightning rods. Success with this method over a period of seventeen years is described by Dean J. B. Whitehead of the Johns Hopkins University engineering faculty, in *Science*.

The equipment is quite simple. Seven-strand copper cable is led to the top of the tree, its end unbraided to give a number of free discharge points, and the lower end soldered to the top of an iron pipe driven eleven feet into the ground. Some trees have been given several such rods. Several of the trees thus equipped had been struck by lightning one or more times before the installation of the rods, but since then no protected tree has been struck, though in some cases other trees near by have suffered.

Science News Letter, December 9, 1933

CHEMISTRY

Blush of Green Solution Betrays Poisonous Lead

LEAD, a poison against which our food, drugs and cosmetics have to be guarded with ever-increasing vigilance, is now made to betray its presence by the red blush it causes in a greenish solution of one of the aniline dyes, diphenyl-thio-carbazone, called "dithizone" for convenience by the chemists. The new test, which has the double advantage of being both delicate and quick, was described before the meeting of the Association of Agricultural Chemists by H. J. Wichmann, of the Food and Drug Administration, U. S. Department of Agriculture.

Food and drug analysts often have to determine whether or not a shipment of fruit is carrying more than the tolerated minimum of lead-spray residue. They cannot take more than a few hours for this. Yet hitherto the quickest accurate lead-determining technique demanded several days. To deliver themselves from this dilemma they made their search for a new and quicker method.

The dye "dithizone" has been known for a long time; it was first described in Germany by the famous chemist Emil Fischer. Fischer even noted the red precipitate caused by the addition of lead. But so far as is now known, nobody had previously discovered the beautifully delicate gradations of color, from the solution's original green through blue and purple to cherry red, that occur when a lead solution treated with ammoniated cyanide is added to a solution of the dye containing chloroform. By matching hues with other