candidate who will be able to identify the specimen.

With regard to the senior leaving examination, the condition in which the specimens reach the different centres has always been a cause of complaint on the part of the candidates.

There is no doubt that every precaution has been taken by the examiner to have the specimens in good condition when they are given to the candidates and yet the results have not been wholly satisfactory. The writer has frequently been under the necessity of keeping plants for several days for class purposes and has never experienced any difficulty in doing so, but the box that is used for keeping them in is much larger than those used in sending out specimens for this examinations.

It is just possible that any defects in the condition of the specimens are the result of an over-anxiety on the part of the examiner to have them in good condition.

Let those who are interested experiment on this point and there can surely be no doubt but that whatever method of packing is found to be the best will be adopted by those in charge of the preparation of the specimens. Let larger boxes be tried and do away with the parafined paper in which the specimens are usually folded.

QUESTIONS IN CHEMISTRY.

Junior Leaving and Pass Matriculation 1894.

3. (*a*) When 60 *cc* of hydrogen and 20 *cc* of oxygen are exploded in a endiometer, what are the volume and the composition of the resulting gas at standard temperature and pressure?

The equation representing the above reactions is $2\ H_2 + O_2 = 2H_2O$. The equation when written as a molecular equation expresses the proportions by volume in which the gases will unite so that we are enabled to state that the 20*cc* of oxygen will unite with 40*cc* of hydrogen to produce water. As the measurements are taken at standard temperature and pressure the water produced will be in liquid form so that its volumes may be disregarded. Consequently, the gas remaining in the endiometer will be hydrogen and there will be 20*cc* of it.

3. (*b*) If olefiant gas (ethylem) were substituted for the hydrogen in part (*a*), what would be the volume and the composition of the resulting gas at 100°*C* and 740 *m m* pressure? Estimate the volume of water produced, measured at 4°6 and 760 *m.m* pressure.

The result of the burning of olefiant gas depends upon the quantity of oxygen supplied during the combustion. If there is a sufficient supply of oxygen the following equation will represent the reaction $6_2H_4 + 3.O_2 = 2CO_2 + 2H_2O$, but if the supply of oxygen is limited as in this question then the oxygen will select the hydrogen in preference to the carbon and the following equation will represent the reaction that occurs $C_2H_4 + O_2 = .2.C. + 2H_2O$.

The following solution is based on this latter equation.

From the equation it will be seen that the 20*cc* of oxygen decompose 20*cc* of the olefiant gas, leaving 40*cc* of it to be measured at 100°*C* and 740 *m.m.*

40*cc* of olefiant gas at 0°*C* and 760 *mm* pressure becomes $40 \times \frac{373}{273} \times \frac{760}{740} cc = 56{,}129\ cc$ at 100°*C* and 740 *m m* pressure.

At the required temperature and pressure the water produced will remain in the form of a gas—and will occupy twice the volume that would be occupied by the olefiant gas from which it is produced when measured