

## THE HIGH SCHOOL AND UNIVERSITY EXAMINATIONS

## FORM IV.—CHEMISTRY.

EXAMINERS: E. C. Jeffrey, B.A.; J. C. McLennan, B.A.; W. Nicol, M.A.

1. Explain the results when :
  - (a) a soap-bubble, filled with air, is dropped into a vessel filled with carbon dioxide,
  - (b) sulphuretted hydrogen gas is passed into a solution of copper sulphate, acidified with nitric acid.
2. A molecule of any gas occupies the same space. Upon what ground is this assumption made? From it deduce a rule for calculating the specific weight of a gas.
3. Describe completely the action of heat on sulphur. The vapor density of sulphur near its boiling point is 96 (hydrogen = 1), at 1040°C. it is 32. What conclusions regarding the molecule of sulphur do you draw from these facts?
4. Explain :
  - (a) how you would obtain and retain for experiment, oxygen from the air,
  - (b) the hardening process that goes on in the mortar in a newly built wall,
  - (c) how you would prepare acetylene gas.
5. How would you prove by experiment that :
  - (a) stannous chloride is a reducing agent,
  - (b) alum acts as a mordant in dyeing,
  - (c) potassium permanganate is an oxidising agent?
6. Describe the group of salts known as the *alums*.
7. Give examples (name and formula) of four classes of cyanogen compounds.
8. Assign the alkaline earth metals their proper place in the classification of the chemical elements in accordance with the *periodic law*, and give reasons for so placing them.
9. Determine the base and acid present in the salt submitted for analysis.

## ONTARIO NORMAL COLLEGE.

## METHODS IN SCIENCE.

EXAMINERS: W. Lohead, B.A., B.Sc.; G. A. Smith, B.A.

1. "A pupil may work conscientiously in the laboratory and study his text book thoroughly and yet receive a very inadequate training."
  - (a) If the teacher is the agent necessary to ensure to the pupil an adequate training, point out his true function in experimental work.
  - (b) To illustrate this function, teach a lesson on the cause of hardness of water found in a limestone region, and lead your class to arrive at the cause of the deposit in vessels in which such water has been boiled. (You are to assume that you have proper laboratory equipment and that your class has reached the stage for such a lesson.)
  - (c) Why?
  - (d) A group of pupils have a dish of mercury and a graduated glass tube about 85 centimeters in length, closed at one end. Lead them to discover the principle of the barometer.
  - (e) When the tube is filled with mercury and inverted in the dish, a pupil thinks that the space above the