# AN ROINN OIDEACHAIS
(Department of Education).

## BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

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## LEAVING CERTIFICATE EXAMINATION, 1937.

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### FULL COURSE.

# CHEMISTRY.

*FRIDAY, 18th JUNE.*—Afternoon, 4 p.m. to 6 p.m.

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(*a*) Not more than *six* questions to be answered. All questions are of equal value.

(*b*) Chemical reactions should be expressed in words and represented by chemical equations.

(*c*) Answers should be illustrated with sketches wherever possible.

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1. State how you proceed in the laboratory to determine the volume composition of Hydrochloric Acid Gas. Show that the molecular weight of the gas is twice its density in relation to hydrogen.

2. Sketch and describe an apparatus by which you would obtain nitrogen from the air and describe *two* methods for preparing nitrogen from chemical compounds.

What is the difference between nitrogen prepared from the air and from chemical sources and what is the explanation of that difference ?

3. Describe the process for the manufacture of lime. Write the equation for the chemical change that takes place in the process. State what you know about some industrial application of lime.

4. Describe, with equations, the changes that take place on heating together each of the following pairs of substances :—

    (*a*) hydrochloric acid and manganese dioxide ;

    (*b*) copper and concentrated sulphuric acid ;

    (*c*) nitre and iron filings ;

    (*d*) sodium sulphate and charcoal.

5. If you were given a mixture of the nitrates of ammonia, iron and lead, how would you prepare pure samples of their chlorides?

6. A boy was asked: "How would you find the equivalent of copper?" and replied as follows: "I would heat a weighed quantity of copper in a crucible until the weight was constant. I would then subtract the weight of the copper taken from the weight after heating to get the weight of the oxygen with which it had combined. From this I would calculate the weight of oxygen that would combine with 8 grams of copper. The result would be the equivalent of copper."

Criticise this answer, pointing out the errors it contains and state how you would determine the equivalent of copper.

7. What is meant by a normal solution?

Describe how you would proceed to make a *decinormal* solution of potassium permanganate. (Atomic weights: K; 39. Mn; 55.)

One gram of steel was dissolved in dilute sulphuric acid and the solution was made up to 100 c.c. 20 c.c. of this solution decolourised 34·2 c.c. of N/10 permanganate. Calculate the percentage of iron in the steel.

(Atomic weight: Fe: 56.)

8. The equivalent of carbon in carbon dioxide is 3 and in carbon monoxide it is 6. Yet chemists have decided that the atomic weight of carbon is 12. Explain as fully as you can the reasons for this decision.

9. Describe the Haber process for the manufacture of ammonia and state what you know about the principles on which the process is based.

Describe the properties of ammonia and mention some of its uses.

10. Give methods for the preparation of ethane and of ethylene.
Compare the action of chlorine on these two substances and show the difference between them by means of constitutional formulae.

11. What are meant by oxidation and reduction?

When copper reacts with nitric acid the copper is said to be oxidised and the nitric acid is said to be reduced. Explain these statements.

12. State what you know about the composition of fat.

How is soap made from fat?

Why will not soap give a lather with hard water?