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(Department of Education.)

LEAVING CERTIFICATE EXAMINATION, 1943.

CHEMISTRY—HONOURS.

WEDNESDAY, 16th JUNE.—MORNING, 10 TO 12.

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

1. Explain what is meant by the equivalent of an element. How is the equivalent of an element related to its atomic weight?

0.238 gram. of the chloride of a metallic element dissolved in water gave, on treatment with silver nitrate, 0.716 gram of silver chloride. The specific heat of the element was 0.25. Find its exact atomic weight, and (using *M* as symbol for the element) write the formula for its chloride.

(Atomic weights : Ag : 107.88. Cl : 35.45).

2. Describe a process for the manufacture of nitric acid.

State briefly (with equations) how you would obtain each of the following substances from nitric acid : (a) potassium nitrate ; (b) potassium nitrite, (c) nitric oxide, (d) nitrous oxide.

3. How would you show that hydrochloric acid gas contains half its volume of hydrogen ?

How does the volumetric composition of hydrochloric acid gas lead to the conclusion that the molecular weight of a volatile substance is twice its vapour density ?

4. Sketch an apparatus for the preparation and collection of carbon dioxide in the laboratory, and explain (with equations) how the apparatus should be used.

How does carbon dioxide act on (a) limestone and water, (b) sodium carbonate, (c) heated carbon ?

5. Give an account of the properties of ammonia.

How would you show that in ammonia three volumes of hydrogen are combined with one volume of nitrogen ?

6. State what you know about the ionic theory of solutions.

Describe what you see when an electric current is passed through a solution of sodium sulphate, and explain, by means of equations, the changes that take place.

7. What is meant by a normal solution ?

0.7 gram of a sample of quicklime required 21 cc. of normal hydrochloric acid to neutralise it exactly. What was the percentage of impurity in the sample ?

(Atomic weight of calcium : 40).

8. In the Periodic Table of the Elements oxygen and sulphur are in one group and nitrogen and phosphorus in another. What reasons can you give for these groupings ?

9. What is meant by the basicity of an acid ?

Give examples of mono-, di- and tribasic acids, and write the formulae of all the sodium salts that each of them is capable of forming.

10. If you were given a mixture of zinc oxide and copper oxide, how would you prepare from it a pure sample of each oxide ?

11. What do you know about (a) the composition of fat, (b) the manufacture of soap, (c) the constitution of glycerine ?

12. How is ethyl alcohol obtained from sugar ?

Write the constitutional formula for ethyl alcohol, and state the reasons on which it is based.