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(Department of Education.)

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LEAVING CERTIFICATE EXAMINATION, 1940.

HONOURS.

CHEMISTRY.

WEDNESDAY, 19th JUNE.—AFTERNOON 4 P.M. TO 6 P.M.

(*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.

(H=1, C=12, N=14, O=16, Cl=35·5, K=39. Gram-molecular volume of a gas=22·4 litres at S.T.P.)

1. Sketch and describe an apparatus used for the automatic generation of hydrogen sulphide.

Of what importance is hydrogen sulphide in qualitative analysis ?

2. What is meant by the term " Law " in Chemistry ?

A certain metal forms two chlorides, A and B. Chloride A contains 55·906 per cent., by weight, of combined chlorine. In chloride B, 1·12 grams of the metal are combined with 2·13 grams of chlorine. Show that these figures illustrate a fundamental law of chemical combination, and state the law.

3. Explain the following terms, illustrating your answer by *one* suitable example in each case :—

(*a*) Atomic weight, (*b*) vapour density, (*c*) valency, (*d*) gaseous diffusion, (*e*) hypothesis.

4. How may sulphur dioxide be prepared in the laboratory ?

Describe the properties of the gas.

How may sulphur dioxide be converted into sulphur trioxide ?

5. What are the effects of heat on any *five* of the following :—

(*a*) Potassium nitrate, (*b*) silver nitrate, (*c*) acid sodium sulphate, (*d*) ammonium hydroxide, (*e*) green vitriol, (*f*) zinc carbonate, (*g*) aluminium hydroxide ?

6. What is understood by a " standard solution " of a substance ?

20 c.c. of a certain dilute solution of hydrochloric acid completely neutralized a solution made by dissolving 0·14 gram of potassium hydroxide in water. Express the concentration of the hydrochloric acid solution in terms of decinormality.

What volume of the given solution of hydrochloric acid should be diluted to 1 litre so that the final solution would be exactly decinormal?

7. Write an account of the Haber process for the production of synthetic ammonia.

8. Give the names and molecular formulae of *two* oxyacids of phosphorus and of their sodium salts.

State how one of the oxyacids may be prepared.

9. Write the structural formula of (*a*) ethyl alcohol, (*b*) acetaldehyde, (*c*) acetic acid.

Calculate the gram-equivalent of acetic acid.

Taking acetic acid as a starting substance, indicate schematically how a sample of methane could be prepared.

10. Describe *one* process for the *commercial* preparation of sodium carbonate.

Mention *two* uses for sodium carbonate.

11. A certain salt, of molecular weight 53·5, was analysed and the following result was obtained : 2·14 grams of the salt consisted of 0·56 gram of nitrogen combined with 0·16 gram of hydrogen and 1·42 grams of chlorine. Find the molecular formula of the salt.

What maximum volume of a gas, measured dry at 7° C. and 760 mms. pressure, could be obtained by boiling 20 grams of the given salt with excess of caustic soda solution ?

12. It is convenient to divide the elements into two groups—the metals and the non-metals.

Summarize the chief physical and chemical characteristics by which metals are distinguished from non-metals. Can this classification of the elements be regarded as a rigid one ? Give reasons for your answer.