

S 43

OXFORD LOCAL EXAMINATIONS

SCHOOL CERTIFICATE

MONDAY, JULY 11, 1949

TIME ALLOWED—1½ HOURS

Theoretical Chemistry II

[Write THEORETICAL CHEMISTRY II at the head of each sheet of your answers.]

Answer Question 1 and any TWO other questions. All questions carry the same number of marks. Illustrate your answers by clear diagrams, and give equations wherever possible.]

1. (a) Mention three methods by which gases are commonly collected, and sketch the arrangement of the delivery tube and gas jar for each method.

State, giving reasons, which method you would use for collecting (i) sulphur dioxide, (ii) carbon dioxide, (iii) ammonia, (iv) carbon monoxide.

(b) Starting from sulphur, indicate briefly how you would prepare in a reasonably pure state (i) hydrogen sulphide, (ii) monoclinic (prismatic) sulphur.

2. Given some copper nitrate, describe, with a sketch of any apparatus and essential details, how you would obtain from it samples of (a) nitric acid, (b) well-crystallized copper sulphate.

3. Describe in detail experiments you would carry out to find whether a given substance was sodium carbonate, sodium bicarbonate, or a mixture of these two substances.

4. Describe all that you would observe, and write equations for the reactions that take place, when—

(a) a mixture of iron and sulphur is heated till nothing further happens and the product, after cooling, is treated with dilute sulphuric acid ;

(b) crystals of lead nitrate are heated strongly in a hard glass tube and the gases given off are passed into water ;

(c) carbon dioxide is passed through lime-water for a long time and one portion of the resulting solution is boiled, and another is treated with more lime-water.

5. In each of the following cases name the substance described, write down its formula, and give equations to show what reactions have taken place :

A is a clear crystalline substance, insoluble in water, which when strongly heated turns white and opaque, giving off carbon dioxide. This white solid reacts violently with water giving a powder which is slightly soluble in water and has a strongly alkaline reaction.

B is a green crystalline substance which when heated strongly gives off water, followed by strongly acid fumes which decolorize potassium permanganate. A red powder is finally left.

C is a dark brown powder which when heated turns yellow and gives off oxygen. The yellow residue, when heated in hydrogen, yields a soft silvery metal which is insoluble in dilute hydrochloric acid but readily soluble in dilute nitric acid.

D is a white crystalline substance which, when gently heated, turns into thick white fumes. The substance is very hygroscopic, and treated with water reacts very violently, giving a strongly acid liquid.

E is a white powder, which when heated gives off carbon dioxide and turns yellow. The yellow substance dissolves in boiling dilute hydrochloric acid without effervescence, and the solution, on cooling, deposits a white crystalline precipitate.