LEAVING CERTIFICATE EXAMINATION, 1969

CHEMISTRY - PASS

FRIDAY, 20th JUNE- Afternoon, 2.00 to 4.30

SIX questions to be answered.

Atomic weights: H = 1, C = 12, O = 16, Na = 23, S = 32, Ba = 137.
Gram-molecular volume = 22·4 litres.
Periodic Table may be obtained from the Superintendent.

1. State clearly what you understand by (i) elements, (ii) compounds, (iii) mixtures. Classify each of the following under the above headings:- (a) sodium, (b) ammonia, (c) air, (d) methane, (e) mercury, (f) carbon dioxide, (g) sodium chloride. Describe briefly the structure of a sodium chloride crystal.

(66 marks)

2. Mention the principal properties of (i) electrons, (ii) protons, (iii) neutrons. Use diagrams to represent the atomic structure of (a) lithium, (b) nitrogen, (c) fluorine, (d) neon, (e) magnesium. Refer to the valence of each of these elements.

(66 marks)

3. According to the kinetic theory $p = \dfrac{nmc^2}{3}$, where p is the pressure of the gas, n is the number of molecules per unit volume of the gas, m is the mass of a molecule and c^2 is the mean square velocity of the molecules. Outline the principal assumptions on which the kinetic theory is based. Using the above equation, or otherwise, show how Boyle's Law may be explained.
   A given mass of gas at 27°C. has a volume of 600 c.c. Find its volume at 77°C., if the pressure remains constant.

(66 marks)

4. What do you understand by (i) molecular weight, (ii) vapour density, (iii) osmotic pressure ?
   Describe with the aid of a sketch of the apparatus how you would measure the vapour pressure of a volatile liquid.
   If 2 gm. of bromine when vapourised have a volume which corresponds to 280 c.c. at S.T.P., calculate the molecular weight of bromine.

(66 marks)

5. What is a normal solution ? How many grams per litre of (i) sodium hydroxide, (ii) sulphuric acid, are required in preparing a normal solution ?

   (a) If 23 c.c. of normal sodium hydroxide were used to neutralise 20 c.c. of a given sulphuric acid solution, calculate the concentration of the given sulphuric acid solution in terms of (i) normality, (ii) grams of sulphuric acid per litre.

   (b) If 20 c.c. of the given sulphuric acid solution were treated with excess barium chloride solution, calculate the mass of the precipitate which would be formed.

(66 marks)

6. Describe, with the aid of a sketch of the apparatus, how you would prepare and collect chlorine.
   Give an account of the properties of chlorine and compare and contrast them with those of bromine.

(66 marks)

7. (a) State what you understand by electronegativity and describe how you would make use of electronegativities. The following table gives the electronegativities of a number of elements:-

H 2·1							He —
Li 1·0	Be 1·5	B 2·0	C 2·5	N 3·0	O 3·5	F 4·0	Ne —
Na 0·9	Mg 1·2	Al 1·5	Si 1·8	P 2·1	S 2·5	Cl 3·0	Ar —

   Why are no values given to the noble gases ?

   (b) State what you understand by the electrochemical series and mention some of its uses.

(67 marks)

8. Write a short account of the properties of (i) sulphur, (ii) sulphur dioxide, (iii) hydrogen sulphide.
   Describe how hydrogen sulphide may be prepared.
   What mass of sulphur may be obtained by the suitable combustion of 1 litre of hydrogen sulphide at S.T.P. ?

(67 marks)

9. Write the structural formula for ethyl alcohol and ethylene and mention the principal properties of these two compounds.
   Show how ethylene may be prepared from ethyl alcohol.

(67 marks)

10. State what you understand by oxidation and reduction.
   Discuss the following reactions in terms of transfer of electrons: (i) the reaction between sodium and chlorine, (ii) the reaction between sulphur and iron. (67 marks)