

LEAVING CERTIFICATE EXAMINATION, 1962.

CHEMISTRY — HONOURS

MONDAY, 18th JUNE.—Morning, 10 to 12.30.

Not more than six questions may be attempted.

Atomic weights:— H = 1, C = 12, N = 14, O = 16, Cl = 35.5, Ca = 40.
Gram-molecular volume = 22.4 litres.

1. Describe how you would prepare and collect dry ammonia.
Give an account of the physical and chemical properties of ammonia and describe how it may be converted into nitric acid.
Find what volume of ammonia, at S.T.P., could be obtained from 1.07 gm. of ammonium chloride and find, also, what volume of 1.1 N sulphuric acid would be required to neutralise the ammonia. (66 marks.)
2. In the case of sulphur or phosphorus, (i) give an account of the physical and chemical properties of the element, (ii) describe briefly the preparation and properties of two of its oxides and two of its acids. (66 marks.)
3. Compare and contrast (i) the properties of the elements magnesium and calcium, (ii) the properties of some of the chief compounds of magnesium and calcium.
Describe the structure of (a) an atom of magnesium, (b) an atom of calcium, and show how the similarity in the properties of their compounds may be explained. (66 marks.)
4. Give an account of the ionic theory of solution.
Describe fully the industrial manufacture of caustic soda and chlorine by an electrolytic method. (66 marks.)
5. Give an account of what you understand by oxidation and reduction. Use equations to illustrate five different examples of oxidation and reduction; one of these should involve carbon, another ferrous sulphate, another sulphur dioxide. (Classical or modern treatment of the topic will be accepted.) (66 marks.)
6. Describe how you would distinguish between (i) nitrates and nitrites, (ii) sulphites and sulphides, (iii) ferrous and ferric ions, (iv) cuprous and cupric ions. Illustrate your answer by means of chemical equations. (66 marks.)
7. (i) An organic acid has the following gravimetric composition: carbon 26.6%, hydrogen 2.2% and oxygen 71.1%. Find its empirical formula.
The calcium salt of this acid contains 31.25% calcium by weight. Write the formula for the calcium salt and state the equivalent of the acid. Name the acid and mention a few of its properties.
(ii) 25 c.c. of a mixture of methane and ethane were exploded with oxygen and gave 39 c.c. of carbon dioxide. What was the composition of the mixture? (67 marks.)
8. Write the structural formula and a brief account of the properties of each of the following:— (i) methyl alcohol, (ii) ethyl alcohol, (iii) formaldehyde, (iv) acetaldehyde.
Show by means of equations the results of oxidising the foregoing substances. (67 marks.)
9. Explain the following terms and in each case name a substance to illustrate your answer and write its structural formula:— (i) a saturated hydrocarbon, (ii) an unsaturated hydrocarbon, (iii) a carbohydrate, (iv) a polyhydric alcohol, (v) an organic acid.
Describe the characteristic chemical properties of unsaturated hydrocarbons. (67 marks.)
10. Give an account of the periodic classification of the elements, explaining particularly the following terms:— (i) group, (ii) short period, (iii) long period, (iv) atomic number, (v) atomic weight.
Select any one group (other than group two) and refer to similarities in the properties of the elements in that group. (A portion of the short form of the table is given here.)

(H)							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	A
K							

(67 marks.)