

[92/131]

1979

SCOTTISH CERTIFICATE OF EDUCATION

CHEMISTRY

Ordinary Grade—PAPER II

Thursday, 10th May—11.30 a.m. to 12.30 p.m.

READ CAREFULLY

1. Check that the answer sheet provided is made out in your name and is for Chemistry.
2. Fill in the details required in the answer sheet. (This is needed for checking purposes.)
3. In this paper a question is answered by indicating the choice A, B, C or D by a stroke made with a pencil in the appropriate place in the answer sheet—see the sample question below.
4. For each question choose ONE answer which you think is correct.
5. Reference may be made to the booklet of Mathematical Tables and Science Data provided.
6. Rough working, if required, should be done only on this question paper, NOT on the answer sheet.

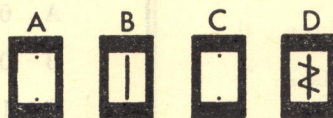
SAMPLE QUESTION

To show that the ink in a ball-point pen consists of a mixture of dyes the method of separation would be

- A fractional distillation
- B chromatography
- C fractional crystallisation
- D filtration.

The correct answer is **B**—chromatography. A **heavy** vertical line should be drawn joining the two dots in the appropriate box in the column headed **B** as shown in the example on the answer sheet.

If after you have recorded your answer you decide that you have made an error and wish to make a change you should cancel the original answer and put a vertical stroke in the box you now consider to be correct. Thus if you want to change an answer **D** to an answer **B** your answer sheet would look like this:



If you want to change back to an answer which has already been scored out you should completely erase all marking with a rubber and re-mark your choice.

1. Which one of the following could give a mixture most like air?

- A 100 cm³ oxygen + 400 cm³ nitrogen + 0.5 cm³ carbon dioxide
- B 100 cm³ nitrogen + 400 cm³ oxygen + 0.5 cm³ carbon dioxide
- C 100 cm³ nitrogen + 400 cm³ hydrogen + 0.5 cm³ carbon dioxide
- D 100 cm³ oxygen + 400 cm³ nitrogen + 100 cm³ carbon dioxide

2. Sulphur is a non-conductor of electricity because

- A the atoms are not free to vibrate
- B the atoms are not in close contact
- C electrons cannot move readily from one atom to the next
- D its atoms do not have a negative charge.

3. A copper atom and a copper(II) ion **must** have different numbers of

- A protons, but the same number of electrons
- B neutrons, but the same number of electrons
- C electrons, but the same number of protons
- D neutrons, but the same number of protons.

4. An atom is neutral because it contains

- A a number of electrons equal to the sum of the numbers of protons and neutrons
- B a number of neutrons equal to the sum of the numbers of electrons and protons
- C a number of protons equal to the number of neutrons
- D a number of electrons equal to the number of protons.

5. Which one of the following compounds has a formula of the type XY₂, where X and Y are positive and negative ions respectively, both having the same electronic arrangement 2,8, as the gas neon?

- A Carbon dioxide
- B Potassium sulphide
- C Sodium oxide
- D Magnesium fluoride

6. The table below shows the ability of substances to conduct electricity.

	<i>Solid</i>	<i>Liquid</i>	<i>Solution in Water</i>
A	No	No	No
B	No	No	Yes
C	No	Yes	Yes
D	Yes	Yes	Insoluble

Which of the above substances, A, B, C, or D could be calcium chloride?

7. A metal ore is roasted in air. It gives off a choking gas and leaves a yellow powder. When the powder is mixed with carbon and heated, grey shiny beads are seen.

Which of the following was present in the ore?

- A Iron carbonate
- B Lead sulphide
- C Lead carbonate
- D Copper carbonate

8. Glucose and fructose are isomers. This means that they

- A are both carbohydrates
- B are both monosaccharides
- C both contain the same functional groups
- D both have the same molecular formula.

9. An analysis of an oxide of tellurium (Te) gave the following result:

Mass of tellurium = 8 g
Mass of oxygen = 1 g

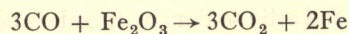
Which of the following formulae correctly represents this oxide? (Take the atomic weight of tellurium as 128, oxygen as 16.)

- A TeO
- B TeO₂
- C TeO₃
- D TeO₄

10. The formula weight of phosphoric acid H₃PO₄ is 98. If 49 g phosphoric acid is dissolved in water and the solution made up to 500 ml, what is the molarity of the resulting solution?

- A 0.33
- B 0.50
- C 1.0
- D 3.0

11. Consider the equation



In this reaction carbon monoxide is acting as

- A an electron acceptor
- B a fuel
- C a reducing agent
- D a basic oxide.

12. A liquid may safely be assumed to be water if it

- A has no smell or taste
- B has a pH of 7
- C boils at 100°C and freezes at 0°C
- D does not conduct electricity.

13. Strontium is a very active metal. Which method is most likely to be used to produce strontium?

- A Heat strontium oxide in a stream of hydrogen.
- B Heat strontium oxide with carbon.
- C Electrolyse strontium chloride solution.
- D Electrolyse molten strontium chloride.

14. When copper is added to concentrated nitric acid, nitrogen dioxide is given off and copper nitrate is formed. Which of the following statements best describes what has happened?

- A The nitric acid has been oxidised.
- B The copper has been oxidised.
- C The copper has been reduced.
- D None of these processes has occurred.

15. The elements listed below were burned in oxygen. The products were mixed with water. For which element would the pH be highest?

- A Copper
- B Iron
- C Calcium
- D Lead

16. In which of the following pH ranges would you expect the solution obtained by mixing 50 cm^3 0.1 M potassium hydroxide and 50 cm^3 0.1 M hydrochloric acid to fall?

- A Above pH 8
- B Between pH 6 and pH 7
- C Exactly pH 7
- D Below pH 6

17. When a certain solution is diluted its conductivity decreases but its pH remains constant. It is a solution of

- A sodium chloride
- B ethanoic acid
- C sodium hydroxide
- D concentrated nitric acid.

Questions 18 and 19 refer to the following classes of reaction:

- A reduction
- B decomposition
- C oxidation
- D neutralisation.

To which of the above classes do the reactions in questions 18 and 19 most clearly belong?

18. $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O} (1)$

19. $\text{Fe}^{2+}(\text{aq}) \rightarrow \text{Fe}^{3+}(\text{aq}) + \text{e}$

20. The following concentrated solutions were electrolysed using platinum electrodes. From which one would only oxygen and hydrogen be liberated at the electrodes?

- A Potassium hydroxide
- B Silver nitrate
- C Magnesium chloride
- D Sodium iodide

21. An element which is a gas at room temperature and pressure could have the electronic configuration

- A 2,8,18,18,8,2
- B 2,8,18,32,18,4
- C 2,8,18,32,18,7
- D 2,8,18,32,18,8

22. A solid, when heated in air, produced a gas which turned bromine water colourless. The solid could have been

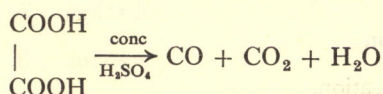
- A an oxide
- B a sulphide
- C a silicate
- D a carbonate.

[Turn over

23. When a solution containing sulphite ions is added to a suspension of iodine in water the iodine dissolves. Which one of the following processes occurs?

A Sulphite ions are reduced to sulphate ions.
 B Iodine is reduced to iodide ions.
 C Sulphite ions are oxidised to sulphur dioxide.
 D Iodine loses electrons.

24. The reaction between oxalic acid and concentrated sulphuric acid may be represented by the equation



In this reaction sulphuric acid is acting as

A a strong acid
 B a dehydrating agent
 C an oxidising agent
 D a reducing agent.

25. Which one of the following could **NOT** be either a straight chain alkane or a straight chain alkene with one double bond?

A C_4H_{10}
 B C_5H_{10}
 C C_6H_{12}
 D C_6H_{10}

26. One of the hydrocarbons in petrol is octane. In excess of air it burns to form carbon dioxide and water. The carbon monoxide in car exhaust gases is formed mainly because

A the combustion of the petrol in the engine is incomplete
 B some other hydrocarbon present does not form carbon dioxide and water on complete combustion
 C carbon dioxide is reduced to carbon monoxide by heat
 D cracking of the hydrocarbons in petrol takes place with carbon monoxide as one of the products.

27. The gas evolved when a mixture of solid ammonium chloride and solid sodium hydroxide is heated is

A ammonia
 B nitrogen
 C hydrogen chloride
 D chlorine.

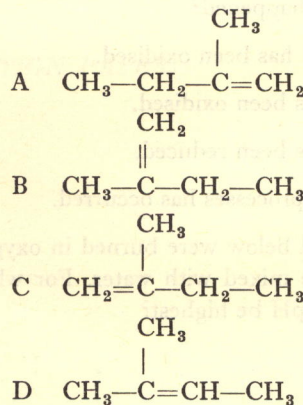
28. Which of the following properties does **NOT** apply to ammonia?

A It is easily liquefied.
 B It is insoluble in water.
 C It burns in oxygen.
 D It forms salts.

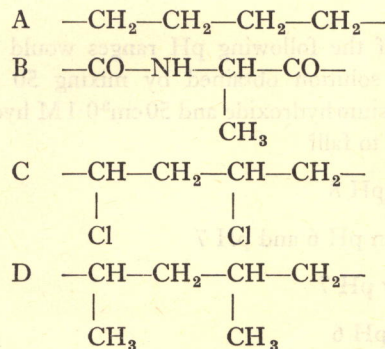
29. Which one of the following does **NOT** result in a net loss of fixed nitrogen from the soil?

A The activity of denitrifying bacteria
 B The discharge of human sewage into the sea
 C The growth of clover
 D The harvesting of cereals

30. Which one of the following formulae represents a compound which is different from the other three?



31. Which one of the following polymers is made by a condensation reaction?



32. In the reaction of photosynthesis the gas produced is

- A carbon dioxide
- B hydrogen
- C nitrogen
- D oxygen.

33. Ethanoic acid reacts with ethanol in the presence of concentrated sulphuric acid to form a compound with a sweet smell. This could be considered as an example of

- A precipitation
- B distillation
- C condensation
- D neutralisation.

34. A solution containing a *mixture* of two carbohydrates showed the following properties:

- (i) it gave a blue-black colouration when a little iodine solution was added;
- (ii) it gave an orange precipitate when warmed with Fehling's (or Benedict's) solution.

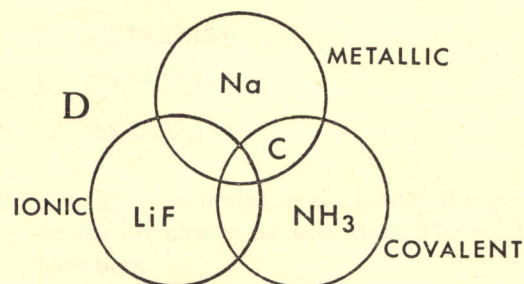
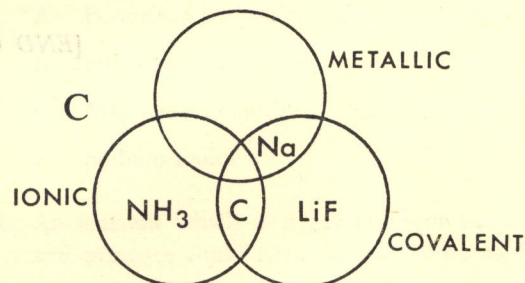
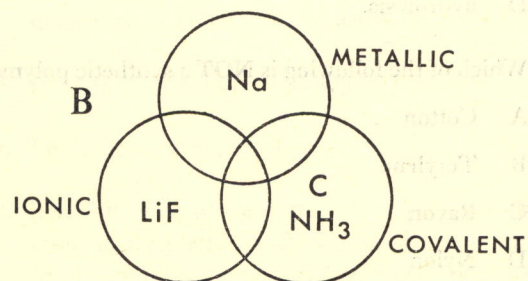
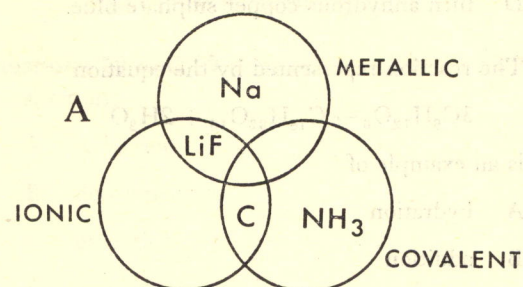
The mixture is

- A starch and sucrose
- B starch and glucose
- C glucose and sucrose
- D starch and cellulose.

35. Substances may be called covalent, ionic or metallic, depending on the bonding and properties which they possess.

Which of the following diagrams classifies most correctly all of the following:—

diamond (C), sodium (Na), ammonia (NH_3) and lithium fluoride (LiF)?



36. A carbohydrate will
- A give carbon dioxide and water when burned in oxygen
 - B give carbon dioxide with dilute hydrochloric acid
 - C give a hydrocarbon on heating
 - D turn anhydrous copper sulphate blue.
37. The reaction represented by the equation
- $$3\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{C}_{18}\text{H}_{32}\text{O}_{16} + 2\text{H}_2\text{O}$$
- is an example of
- A hydration
 - B addition
 - C condensation
 - D hydrolysis.
38. Which of the following is **NOT** a synthetic polymer?
- A Cotton
 - B Terylene
 - C Rayon
 - D Nylon
39. In which of the following ways have metamorphic rocks been formed?
- A By the cooling and solidification of molten rock
 - B By the effect of pressure on particles of weathered rock
 - C By the effect of extreme pressure and temperature on existing rocks
 - D By the evaporation of water from seas
40. Carbon monoxide would be converted into carbon dioxide in the laboratory by passing it over
- A carbon
 - B magnesium oxide
 - C iron filings
 - D copper(II) oxide.

[END OF QUESTION PAPER]