

- (b) Calculate the mass of calcium metal which reacted with copper (II) nitrate solution. (Relative atomic mass of Ca= 40) (2 marks)
- (c) The resulting mixture in (a) above was filtered and aqueous sodium hydroxide added to the filtrate dropwise until in excess. What observations were made? (1 mark)
- (d) (i) Starting with calcium oxide, describe how a solid sample of calcium carbonate can be prepared. (3 marks)
- (ii) Name **one** use of calcium carbonate. (1 mark)

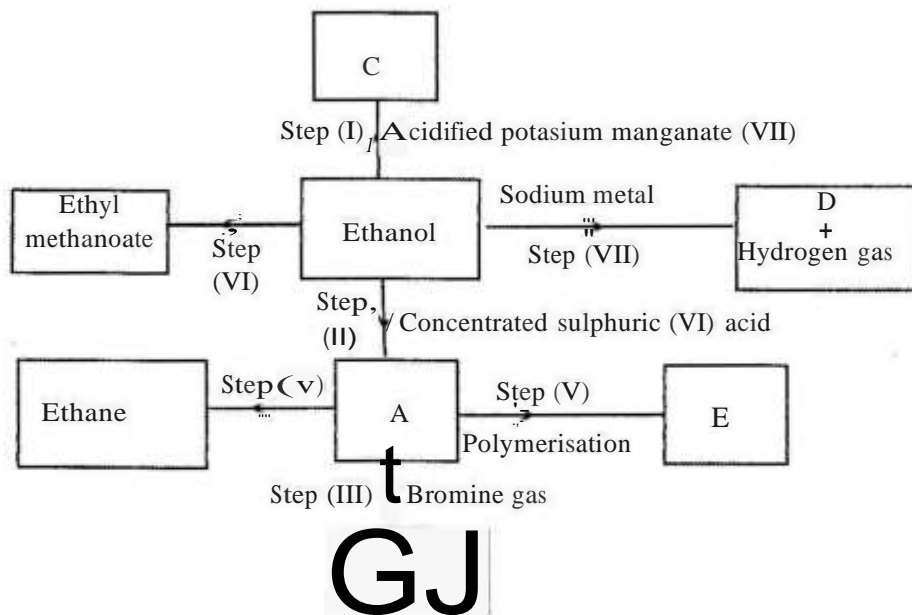
5 (a) Other than their location in the atom, name **two** other differences between an electron and a proton. (2 marks)

- (b) The table below gives the number of electrons, protons and neutrons in particles **A, B, C, D, E, F** and **G**.

Particle	Protons	Electrons	Neutrons
A	6	6	6
B	10	10	12
C	12	10	12
D	6	6	8
E	13	10	14
F	17	17	18
G	8	10	8

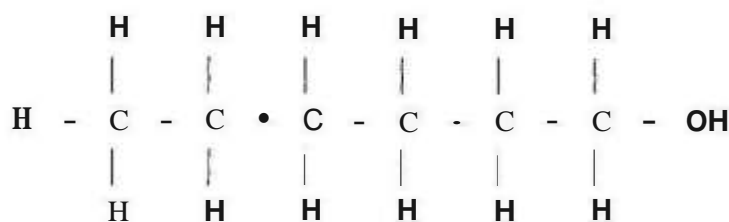
- (i) Which particle is likely to be a halogen? (1 mark)
- (ii) What is the mass number of **E**? (1 mark)
- (iii) Write the formula of the compound formed when **E** combines with **G**. (1 mark)
- (iv) Name the type of bond formed in (iii) above. (1 mark)
- (v) How does the radii of **C** and **E** compare? Give a reason. (2 marks)
- (vi) Draw a dot (.) and cross (x) diagram for the compound formed between **A** and **F**. (1 mark)
- (vii) Why would particle **B** not react with particle **D**? (1 mark)

6 (a) Study the flow chart below and answer the questions that follow.



- (i) I What observation will be made in Step I? (1 mark)
- II Describe a chemical test that can be carried out to show the identity of compound **C**. (2 marks)
- (ii) Give the names of the following: (2 marks)
- I **E**
- II Substance **D**
- (iii) Give the formula of substance **B**. (1 mark)
- (iv) Name the type of reaction that occurs in: (1 mark)
- I Step (II)
- II Step (IV)
- (v) Give the reagent and conditions necessary for Step (VI). (2 marks)
- Reagent:
- Conditions:

- (b) O Name the following structure.



(1 mark)

- (i) Draw the structure of an isomer of pentene.

(1 mark)

- 7 (a) What is meant by molar heat of combustion?

(1 mark)

- (b) State the Hess's Law.

(1 mark)

- (c) Use the following standard enthalpies of combustion of graphite, hydrogen and enthalpy of formation of propane.

$$\Delta_c H^\ominus (\text{Graphite}) = -393 \text{ kJ mol}^{-1}$$

$$\Delta_c H^\ominus (\text{H}_2(\text{g})) = -286 \text{ kJ mol}^{-1}$$

$$\Delta_f H^\ominus (\text{C}_3\text{H}_8(\text{g})) = -104 \text{ kJ mol}^{-1}$$

- (i) Write the equation for the formation of propane.

(1 mark)

- (ii) Draw an energy cycle diagram that links the heat of formation of propane with its heat of combustion and the heats of combustion of graphite and hydrogen.

(3 marks)

- (iii) Calculate the standard heat of combustion of propane.

(2 marks)

- (d) Other than the enthalpy of combustion, state **one** factor which should be considered when choosing a fuel.

(1 mark)

- (e) The molar enthalpies of neutralization for dilute hydrochloric acid and dilute nitric (V) acid are -57.2 kJ/mol while that of ethanoic acid is -55.2 kJ/mol . Explain this observation.

(2 marks)