1. a) What is rust? is the corrosion of iron due it reaction with atmospheric oxygen and moisture. (1mk)

b) Give two methods that can be used to prevent rusting (2mks)

1. Painting
2. Coating with other metals
3. Sacrificial protect ion
4. Alloying

2. 2. In an experiment to separate a mixture Q of two miscible liquids, Liquids N (B.P 56°C) and liquid M (B.P 118°C) a student set up the apparatus as shown.

HEAT

a) What makes it possible to separate substances using this method? (1mark)

Their close but different boiling point

b) Name X (1mark)

Fractionating column

c) What is the purpose of the apparatus labelled X? (1mark)

Provide room for condensation of the vapour

d) Identify one mistake in the set up (1mark)

The water in and water out have been interchanged

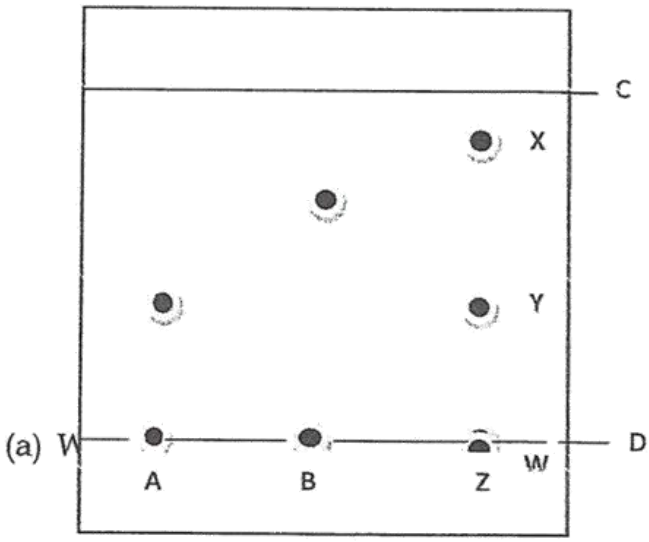
e) Which liquid was collected in the beaker as the first distillate? (1mk)

Liquid M because it has lower boiling point

f) Give any two industrial application of this method of separation of mixtures. (2mks)

1. Distillation of crude oil
2. Distillation of liquidefied air

3. Sports of pure pigments A and B and a mixture Z were placed on a filter paper and allowed to dry. The paper was then dipped in a solvent. The results obtained were as on the paper chromatogram.



(a) (2mks)

i) Base line

(ii) Solvent front - C

(b) Which of the pure pigments was a component of Z? Explain. (2mks)

A. because the spot Y in mixture Z moved the same distance as that of pure pigment F

(c) (i) Name a solvent that is used in paper chromatography. (1mk)

Propanone

(ii) Why is water not a suitable solvent in paper chromatography? (1mk)

Because it does not dissolve the pigments

(d) Write a chemical equation for the reactions between

(i) Carbon and oxygen - (1mks)

1. $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$ $\quad 2.\ 2C_{(s)} + O_{2(g)} \longrightarrow 2CO_{(g)}$

4. Write down the correct chemical equations for the word equation below and then balance them fully

a) sodium oxide +water→ sodium hydroxide (1mk)

$Na_2O_{(s)} + H_2O_{(l)} \longrightarrow 2NaOH_{(aq)}$

b) Copper +oxygen→ Copper (ii) oxide (1mk)

$2Cu_{(s)} + O_{2(g)} \longrightarrow 2CuO_{(s)}$

c) Carbon +oxygen→ Carbon (ii) oxide (1mk

$2C + O_2 \longrightarrow 2CO$

5. Define the following terms. (2mks)

a. Atomic number; is the number of proton in a nucleus of an atom.

b. Radical; is the sum of proton and neutron in an atom of an element.

6. The grid below represents part of the periodic table. Study it and answer the questions that follow. The letters are not the actual symbols of the elements

(i) Select the most reactive metal. Explain (2 mks)

H. because the outermost electron is loosely hence easily lost

(ii) Select an element that can form an ion with a charge of 3- (2mks)

F

(iii) Select an alkaline earth metal (1 mks)

D

iv) Which group 1 element has the highest first ionization energy? Explain (2mks)

A. because has stronger forces of attraction as compared to others

7.The electron arrangement of ions X3 + and Y-2 are 2:8 and 2:8:8 respectively.

a)Write the electron arrangement of elements "X" and "Y" (2mks

X = 2.8.3

Y = 2.8.6

b)Write the formula of the compound that would be formed between X and Y.

X_2Y_3 (2mk)

8.An element Y has the electronic configuration of 2:8:5

a) Which period of the periodic table does the element belong. (1mk)

Period 3

b) Write the formula of the most stable anion formed when element Y ionizes. (2mks)

Y^{3-}

c) Explain the difference between the atomic radius of element Y and ionic radius. (2mks)

The ionic radius is larger than atomic radius due electron repulsion

9. The table below shows the relative atomic masses and the percentage abundance of the isotopes L_1, L2 of element L

	Relative atomic masses	% abundance
L_1	62.93	69.09
L_2	64.93	30.91

Calculate the relative atomic mass of element L. (3mks)

R.A.M = $\frac{(62.93 \times 69.09) + (64.93 \times 30.9}{100}$

$= 63.55$

10. Use the information in the table below to answer questions that follows. That follows. The letters do not represent the actual symbols of the elements.

Elements	B	C	D	E	F
Atomic numbers	18	5	3	5	20
Mass Numbers	40	10	7	11	40

a) Which two letters represent the same element? Give a reason (2mks)

C and E because they have the same Atomic mass number.

b) Give the number of neutrons in an atom of element D (1mk)

D = 7 - 3

= 4

11. a) What is an isotope? (1mk)

Are atoms of the same element having same atomic number but different mass number

b) Determine the relative atomic mass of argon whose isotope mixture is (3mks)

36. Ar (0.34%) 38Ar (0.06%) 40 Ar (99.6%)

18 18 18

$\frac{(36 \times 0.34) + (38 \times 0.06) + (40 \times 99.6)}{100}$

$= 39.9$

12. An element "z" has a mass number of 33 and has 18 neutrons

a) What is the atomic number of element Z? (1mk)

33 - 18 = 15

b) Write an equation to show how atom of "z" forms an ion. (2mk)

$3Z + 3e^- \longrightarrow Z^{3-}$