FORM 2, CHEMISTRY, MID-TERM 2 2024 EXAM

MARKING SCHEME

Answer all questions.

1. The table below gives the atomic numbers of elements represented by letters K,L,M and N.

Element	K	L	M	N
Atomic number	15	16	17	20

a) Name the type of bond that exists in the compound formed between;

   N and L   **Ionic bond**   (1 mk)

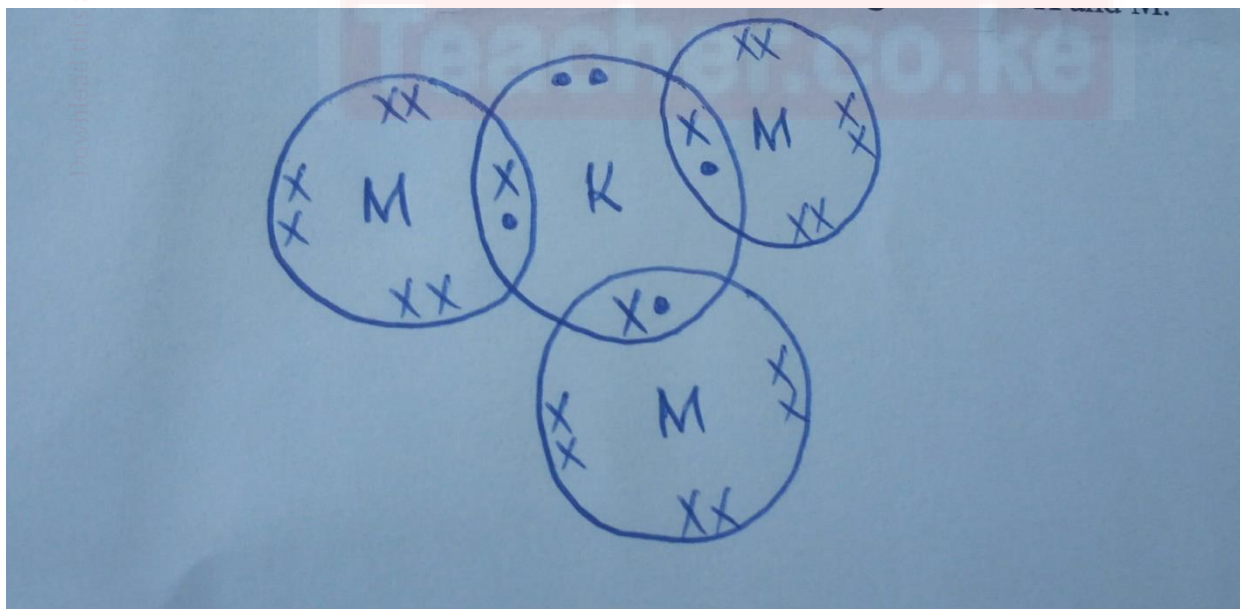   K and M **covalent bond**   (1 mk)
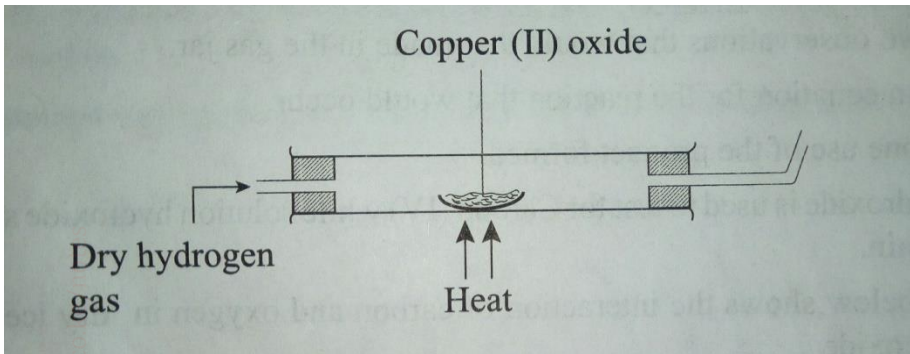
b) Give a reason for your answer in each case in (a) above.   (2 mks)

 N&L N loses 2 electrons to form N2+ .The 2 electrons are gained by L to form L2 –

K& M both are non metals . therefore share electrons

c) Use a dot(•) and cross(×) diagram to show bonding between K and M.   (1 mk)

2. In an experiment,hydrogen gas was passed over heated copper(II) oxide as shown.

a) State the observations made in the combustion tube after the experiment.(2 mks)

Black copper (ii) oxide changes to brown solid. A colourless liquid collects on the cooler part of the tube.

b. Write an equation for the reaction between copper (II) oxide and hydrogen gas.(1 mk)

$CuO + H_2 \longrightarrow Cu + H_2O$

b) Explain why heat is necessary in this experiment.(1 mk)

For speeding up the reaction.

3. Define the following terms:(3marks)

i)Hygroscopy

process by which salts absorb water from the atmosphere without forming solutions.

ii)Deliquescence

process by which salts absorb water from the atmosphere to form solutions.

iii)Efflorescence

process by which salts loose their water of crystallization when exposed to the atmosphere.

4. Differentiate the following terms:

a) Anode and cathode (2 mks)

Anode- electrode connected to the positive terminal of the battery while cathode is the electrode connected to the negative terminal of the battery

b) Electrolysis and an electrolyte(2marks)

electrolysis – process of decomposing an electrolyte by passing an electric current through it.

Electrolyte- a substance which when melted or dissolved in water conducts an electric current and gets decomposed.

c)State two applications of electrolysis(2marks)

purify metals

electroplating metals

5. a) What is an isotope?(2 mks)

Atoms of the same element with the same atomic no but different mass no.

b) Lithium has two isotopes with mass number 6 and 7.If the relative atomic mass of lithium   is 6.94,determine the percentage abundance of each isotope.(2 mks)

R.A.M =(mass of isotope 1 x relative abundance) + (mass of isotope 2 x relative abundance)/ 100

6.94=(6x100-x)/100 +7x(x)/100

694= 600-6x+7x

Isotope with mass no 6= 6%

Isotope with mass no 7= 94%

6. The diagrams below represent two nails with some parts covered tightly with zinc and tin respectively.Explain the observations that would be made at the exposed points R and Z if wrapped nails are left in the open for several days.(3 mks)

At R –No rusting occurred. Zinc is more reactive than iron hence reacts with moist air instead of iron

At Z – rusting occurred. Tin is less reactive than iron hence reacts with moist air to form rust.

7. Study the flow chart below and answer the questions that follow.
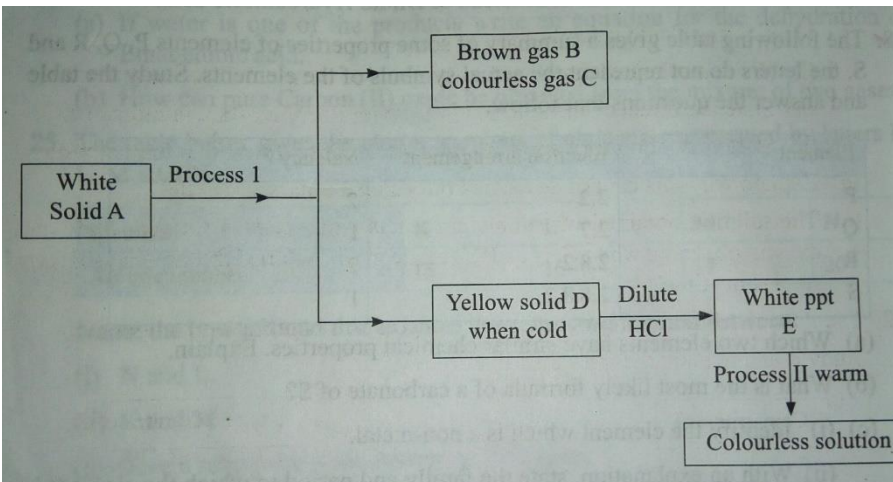
a) Identify substances;(3 mks)

A **Lead(ii) nitrate**

D lead (ii) oxide

E lead (ii) chloride

b**)**Name process 1.(1 mk)

c) Describe the test for colourless gas C.(1 mk)

 **when a glowing splint is lowered into a gas jar of C it relights it**

d)Write a balanced equation for the formation of white precipitate E.(1 mk)

PbO + 2HCL $\longrightarrow$ PbCl2 +H2O

e) What does process (II) indicate about the solubility of E? (1 mk)

E is soluble in warm water. Its' solubility increases with increase in temperature

8.The diagram below shows a set up which was used by a student to investigate the effect of electricity on molten lead (II) iodide.
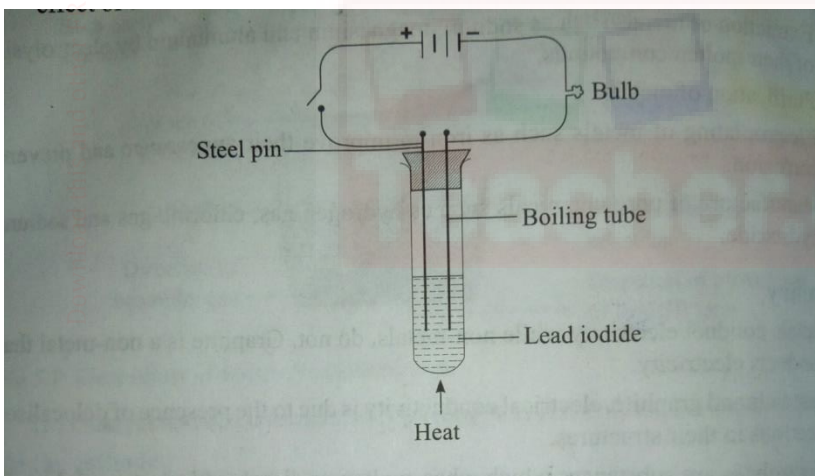
a) Explain what happens to the lead iodide during electrolysis.(2 mks)

A purple vapor of iodine gas is produced at the anode while grey beads of lead metal are formed at the cathode. Iodine gas and lead metal are produced as a result of the decomposition of the lead iodide by the electric current

b) Why does solid lead(II) iodide not allow the passage of electricity?(1 mk)

In the solid state, the ions are held firmly by strong electro static forces and thus can't move.

c) Why was it important to carry out the experiment in a fume chamber?(1 mk)

The vapor of iodine gas is poisonous

d) Write equations to show the reaction taking place? (2 mks)

i. At the cathode.

$Pb^{2+} + 2e^- \rightarrow Pb(s)$

ii. **At the anode.**

$2I^- \rightarrow I_2 + 2e^-$

9. Describe how the following reagents can be used to prepare lead sulphate.(3 mk**s)**

Solid potassium sulphate,solid lead carbonate,dilute nitric (V) acid and distilled water.

Dissolve solid potassium Sulphate in the distilled water to obtain potassium sulphate solution.

Add solid lead carbonate to the dilute nitric (v) acid to obtain lead nitrate solution.

Mix the lead nitrate solution with pottasium sulphate solution and stir using a glass rod. A precipitate of lead sulphate will be formed. Filter and dry the lead sulphate between filter papers .

10. Spots of pure pigments A and B and a mixture of 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.
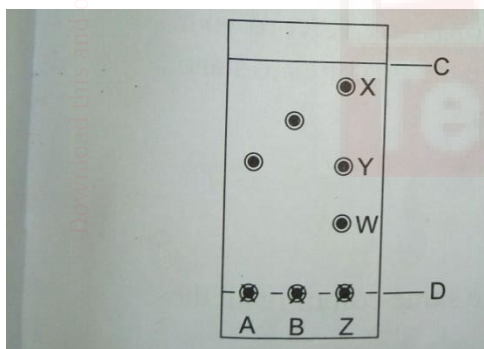
a) Which is the:(2 mk)

i. Base line? **D**

ii. Solvent front? **C**

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

A - Spot Y in the mixture of Z moves the same distance as the spot in the pure substance A

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

Propanone

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

Water cannot dissolve the colouring matter

11. When lead nitrate and magnesium sulphate react, a white precipitate is formed.

    i.   Identify the white precipitate. Give a reason.(2 mks)

         Lead sulphate – its an insoluble salt

    ii.   Write an ionic equation for the reaction.(1 mk)

$Pb^{2+} + SO_4^{2-} \longrightarrow PbSO_4$