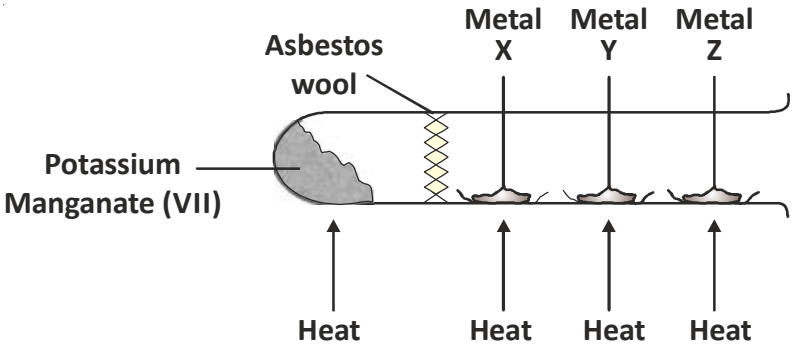
01 The apparaus shown below is used to study the reactions between metals X, Y and Z with oxygen.



The metals were first heated until red-hot before heating the potassium manganate (VII). The results of the experiment are shown below.

Metals	Observations
X	Glowed weakly; black residue
Y	Burned brightly; brown residue
Z	Glowed brightly; yellow residue

a) How was oxygen produced in this experiment ?

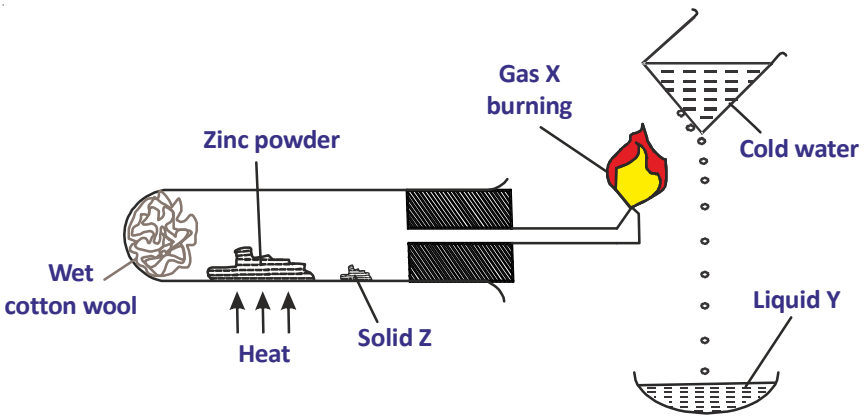
b) Based on the observations in the given table, arrange the metals X, Y and Z in order of increasing reactivity.

(a) On heating potassium manganate (VII), It decomposed to liberate oxygen gas.

(b) X, Z, Y

The more reactive the metal, the more vigorous is the reaction.

02 The apparatus shown below is used to show the reaction between zinc and steam. The hot gas obtained by burning gas X condensed to the colorless liquid Y. At the end of the reaction, a white solid Z was left inside the test tube.



(A) What is Gas X ?

(B) What is liquid Y ?

(C) What is solid Z ?

(A) Gas X is hydrogen;

(B) Liquid Y is water

(C) Solid Z is zinc oxide

03 (a) The reactivity series is a list that arrange the metals in the order of their reactivity. List all the metals, including carbon and hydrogen in the brackets, in the reactivity series in descending order of reactivity, i.e., from the most reactive to the least reactive.

K, Na, Ca, Mg, Al, (C), Zn, Fe, Pb, (H), Cu, Ag

(b) The metals given below are allowed to react with cold water or steam and dilute acids.

Zinc	Magnesium	Potassium	Copper	Sodium	Lead	Calcium	Iron

Write the names of the metals in column 3 of the table given below that show the following observations in the reactions.

With cold water or steam (1)	With dilute acids (2)	Metal (3)
No reaction with steam	No reaction	Copper
Quite slow with steam	Quite reactive	Zinc
Quite reactive with cold water	Vigorous	Calcium
No reaction with steam	Extremely slow	Lead
Extremely vigorous and explosive with a purple/lilac flame with cold water	Explosive and violent	Potassium
Very slow	Moderate reactive	Iron
Very vigorous and may catch fire	Very vigorous	Sodium
Very slow with cold water but fast reaction with steam	Very fast reaction	Magnesium

04 When sodium is placed in water, bubbles of which gas is evolved.

(a) (i) What happens to the pH value of the solution after the reaction ?

(ii) Explain your answer.

(b) (i) Name the gas produced.

(ii) Describe a confirmatory test for this gas.

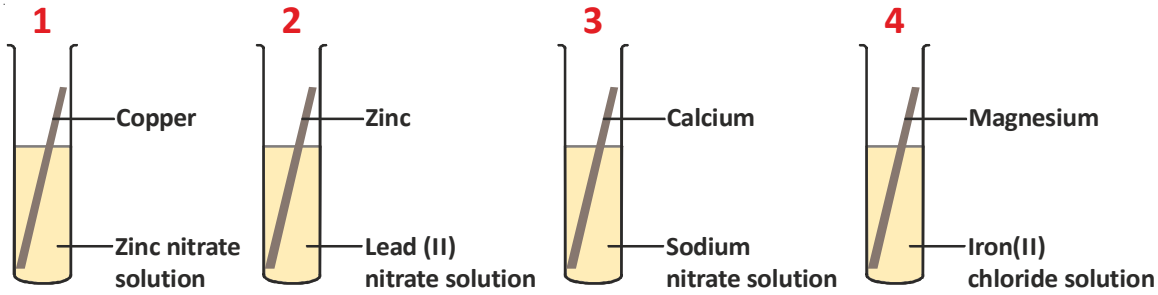
(a) (i) Hydrogen gas is evolved. The pH value increases from 7 to 14.

(ii) When a metal reacts with water, the reaction produces sodium hydroxide which is a strong alkali.

(b) (i) Hydrogen

(ii) The gas extinguishes a lighted splint with a 'pop' sound.

05 Four test tubes 1 to 4 were set up as shown below.



(a) (i) Write the type of reaction, if at all it takes place in the test tubes.

Displacement reaction

(ii) How does this type of reaction relate to the reactivity of metals ?

A more reactive metal will displace ions of a less reactive metal from its solutions.

(b) Complete the table given below to show the results of this experiment by using the following symbols.

Indicates reaction takes place

Indicates no reaction takes place

Test tube	1	2	3	4
Result	✘	✔	✘	✔