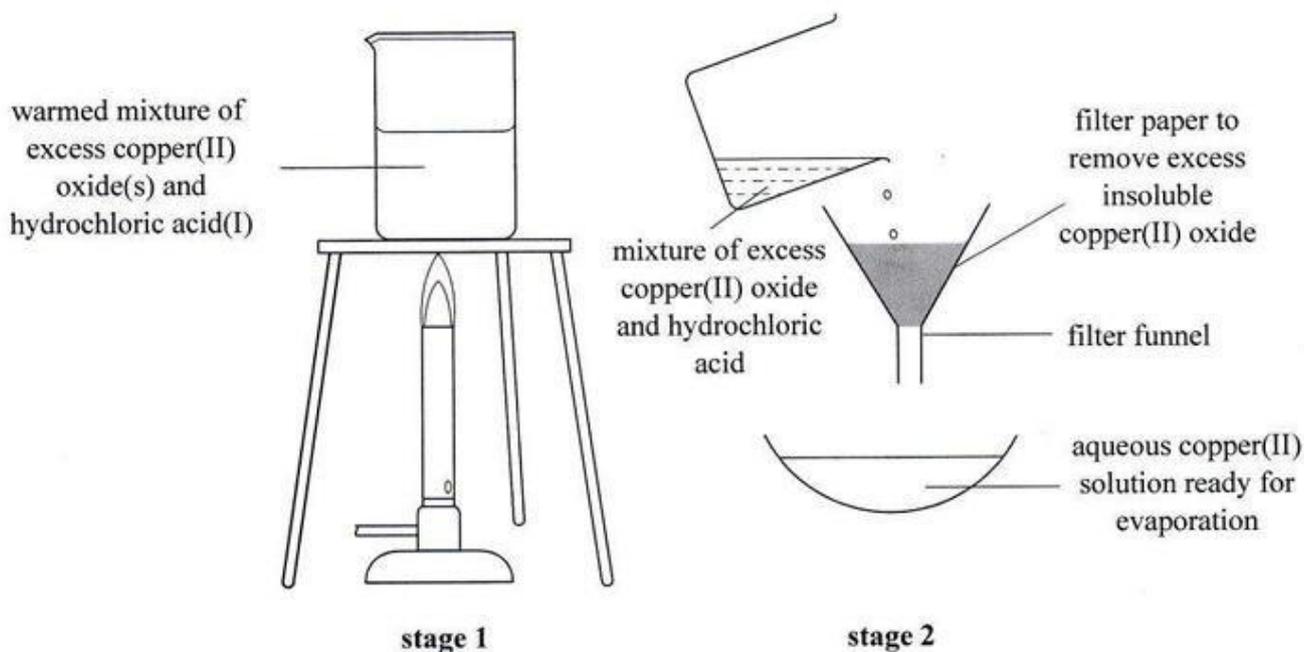


3. (a) Litmus turns red in acid and blue in alkali.

Write the formulae of the ions in an acid and an alkali that cause litmus to have these colours.

acid _____ alkali _____ [2]

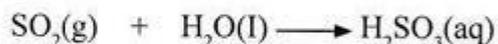
- (b) The diagrams show the method of preparing a solid sample of a soluble salt, copper(II), using a base, copper(II) oxide, and an acid, hydrochloric acid.



- (i) Explain why excess copper(II) oxide is added to hydrochloric acid in **stage 1**.
_____ [1]
- (ii) State the pH of the copper(II) chloride solution in **stage 2**.
_____ [1]
- (iii) After **stage 2**, the copper(II) chloride solution is heated.
Explain the reason for heating the copper(II) chloride solution.
_____ [1]
- (iv) Balance the chemical equation for the reaction between CuO and HCl(aq).
_____ CuO(s) + _____ HCl(aq) → _____ CuCl₂(aq) + _____ H₂O(l) [1]

- (c) Coal, crude oil and natural gas contain small amounts of sulfur, which produces a colourless, toxic gas when burned in oxygen gas. The gas dissolves in rainwater and produces acid rain.

The chemical equation for this reaction is shown.



- (i) Write a word equation for this chemical equation.

_____ [1]

- (ii) Calculate the relative molecular mass of the product.

[1]

- (iii) Determine the amount, in moles, in 41 grams of H_2SO_3 .

[1]

- (iv) One way of reducing acid rain is to generate electricity without using fossil fuels. Instead, we can use renewable energy sources.

Name **ONE** renewable energy source.

_____ [1]

TOTAL MARKS [10]