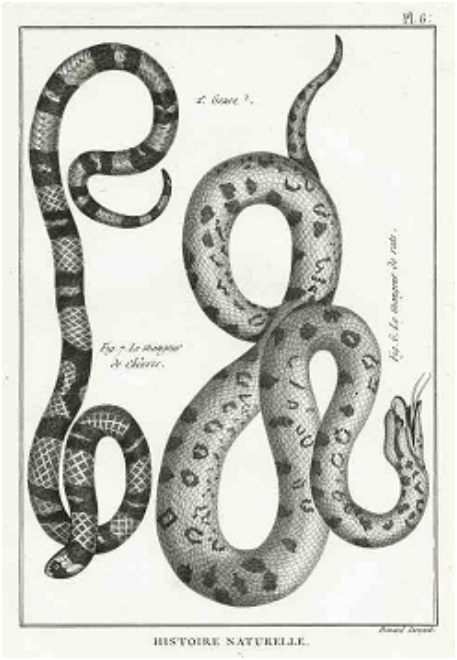
Q1. Printed pictures can be made using etchings.



An etching can be made when a sheet of brass reacts with iron chloride solution.

(a) Brass is a mixture of two metals, copper and zinc.

(i) A mixture of two metals is called ..... .

(1)

(ii) Draw a ring around the correct answer to complete the sentence.

Copper and zinc atoms are different sizes.

This makes brass

harder
more flexible
softer

than the pure metals.

(1)

(b) Iron chloride has the formula $FeCl_3$

Relative atomic masses (A_r): Cl = 35.5; Fe = 56.

(i) Calculate the relative formula mass (M_r) of iron chloride ($FeCl_3$).

.....

.....

.....

Relative formula mass (M_r) of iron chloride = ...

(2)

(ii) Calculate the percentage of iron in iron chloride ($FeCl_3$).

.....

.....

.....

Percentage of iron in iron chloride = ...%

(2)

(Total 6 marks)

Q2. Calcium oxide (quicklime) is made by heating calcium carbonate (limestone).

calcium carbonate	→	calcium oxide	+	carbon dioxide
100 g		?		44 g

(a) 44 grams of carbon dioxide is produced when 100 grams of calcium carbonate is heated.

Calculate the mass of calcium oxide produced when 100 grams of calcium carbonate is heated.

.....

mass ..... g

(1)

(b) What mass of carbon dioxide could be made from 100 tonnes of calcium carbonate?

mass ..... tonnes

(1)

(Total 2 marks)

Q3. Nitrates, such as ammonium nitrate, are added to soil to help plant growth.

(a) When rain falls nitrates dissolve and can end up in drinking water.
Nitrates in drinking water can stop respiration in babies. This only happens if there is a lot of nitrate in the drinking water.

Plants use nitrates for growth. Humans need plants. Should large amounts of nitrates be added to soil?
Give **two** reasons for your answer.

Answer .....

Reason 1 .....

.....

Reason 2 .....

.....

(2)

(b) The amount of nitrogen in a nitrate compound is important.

(i) How many nitrogen atoms are there in the formula of ammonium nitrate, NH_4NO_3

.....

(1)

(ii) Calculate the percentage of nitrogen in ammonium nitrate, NH_4NO_3.

(Relative atomic masses: H = 1; N = 14; O = 16)

.....

.....

.....

Percentage of nitrogen in ammonium nitrate = ... %

(3)
(Total 6 marks)

Q4. Hydrated copper sulphate is a blue solid. When it is heated, white solid anhydrous copper sulphate is made. This is a reversible reaction.

hydrated copper sulphate (blue) [+ heat energy] $\rightleftharpoons$ anhydrous copper sulphate (white) + water

(a) To make the forward reaction work, the hydrated copper sulphate must be heated all the time.

What type of reaction is this?

.....

.....

(1)

(b) Anhydrous copper sulphate can be used in a test for water. What **two** things will happen when water is added to anhydrous copper sulphate?

1 .....

.....

2 .....

.....

(2)
(Total 3 marks)

Q5. Calculate the percentage of iron in iron sulphate ($FeSO_4$).

(Relative atomic masses: Fe = 56, O = 16, S = 32)

.....

.....

.....

.....

Percentage of iron in iron sulphate = ...%
(Total 3 marks)