

9E Reactions of metals and metal compounds

Assessment for learning...year 9 (level 3-6)

Answer all questions:

Total marks	24
Time allowed	25 mins.

Sodium hydrogencarbonate is present in indigestion powders. It is often called bicarbonate of soda. Sodium hydrogencarbonate:

is a white solid;

does not smell;

forms a solution with a pH of about 8.5;

is very soluble in water;

is not poisonous.

(a) (i) Is sodium hydrogencarbonate solution acidic, alkaline, or neutral?

.....

1 mark

(ii) Indigestion can be caused by too much acid in the stomach.

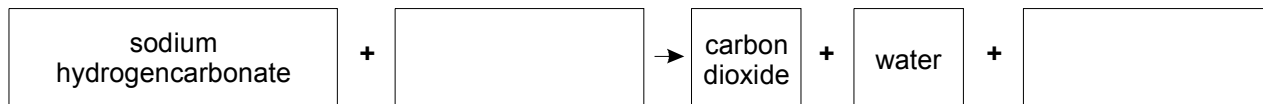
Which **two** pieces of information in the list are the most important reasons why sodium hydrogencarbonate can be used as an indigestion powder?

1

2

2 marks

(b) Nitric acid reacts with sodium hydrogencarbonate. The salt formed is a nitrate. Fill in the boxes to complete the word equation.



1 mark

(c) An indigestion powder contains sodium hydrogencarbonate and a small amount of citric acid. The powder starts to fizz when it is added to water.

What gas is given off when the mixture fizzes?

.....

1 mark

Maximum 5 marks

Question 2:

The table shows some of the chemical reactions of four elements.

element	reaction with water	reaction with dilute hydrochloric acid	reaction when heated in air
A	none	none	burns to give an acidic oxide
B	vigorous, hydrogen given off	violent, gas given off	burns to give a basic oxide
C	none	none	reacts slowly to give a basic oxide
D	none	vigorous, gas given off	burns to give a basic oxide

(a) Elements B, C and D are all metals. Write the letters down in order of the reactivity of the metals starting with the **most** reactive.

most reactive

1 mark

(b) (i) Name **one** gas, present in the air, with which all four elements will react.

.....

1 mark

(ii) Name the gas which is produced when element D reacts with dilute hydrochloric acid.

.....

1 mark

(c) What evidence is there to show that element A is the only non-metal?

.....

.....

1 mark

(d) Give the name of an element which could be element B.

.....

1 mark

Maximum 5 marks

Question 3:

Kerry made some copper sulphate crystals. She wrote a description of what she did.

I heated some dilute sulphuric acid in a beaker and added some copper oxide to it. I stirred the mixture until it became a clear blue colour. I added more copper oxide until no more would react and then filtered the mixture into a dish. A black solid was left on the filter paper. I left the solution in the dish for a week and saw that the liquid had gone and blue crystals were left.

Use the information in Kerry's description to answer the questions below.

(a) What colour is:

(i) copper sulphate solution?

.....

1 mark

(ii) copper oxide?

.....

1 mark

(b) Write down a word equation for the reaction which took place in the beaker.

..... + → + water

1 mark

compound		bond strength in KJ/mol	action of heat on the compound
name	formula		
hydrogen fluoride	HF	570	stable
hydrogen chloride	HCl	432	fairly stable
hydrogen bromide	HBr	366	some bromine formed
hydrogen iodide	HI	298	

Use the information in the table to answer the following questions.

(i) Suggest why hydrogen iodide may not exist at room temperature.

.....

1 mark

(ii) Describe how the bond strength of these compounds varies in group VII.

.....

1 mark

(iii) Which compound in the table requires the highest temperature to make it decompose?

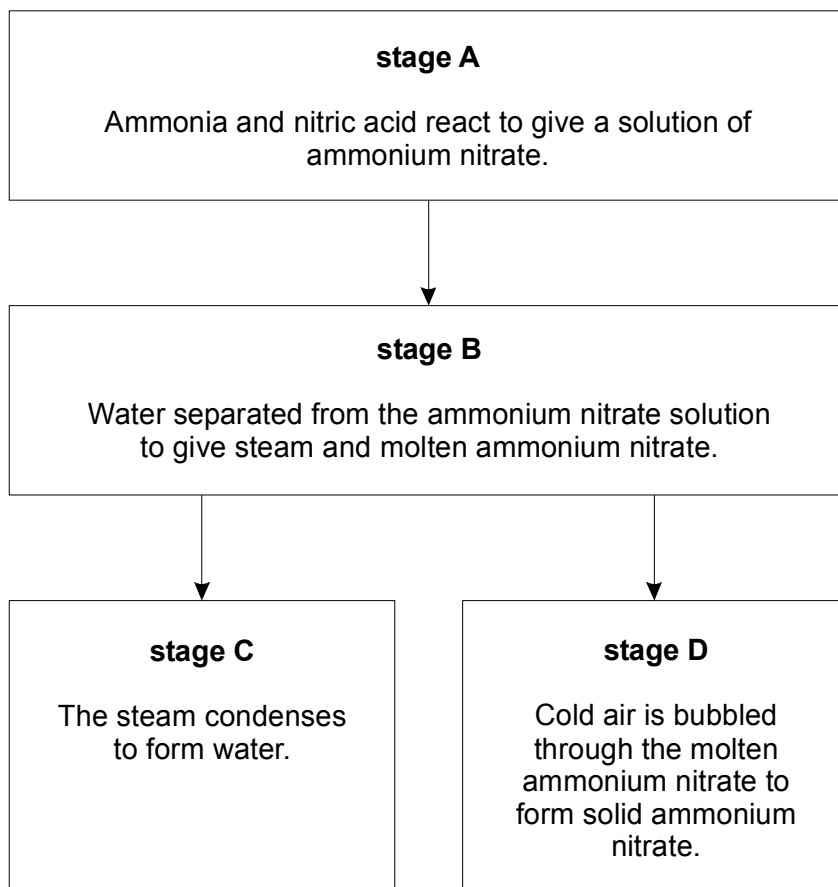
.....

1 mark

Maximum 5 marks

Question 5:

Ammonium nitrate is used as a garden fertiliser. It is manufactured by the reaction between ammonia gas and nitric acid. The diagram below represents stages in the process for making ammonium nitrate.



(a) Ammonia is an alkaline gas. In stage A, an alkali reacts with an acid. What effect does an alkali have on an acid?

.....

1 mark

(b) The formula for ammonium nitrate is NH_4NO_3 .

(i) How many different elements are there in ammonium nitrate?

.....

1 mark

(ii) How many atoms are represented in the formula for ammonium nitrate?

.....

1 mark

(c) Potassium nitrate is also a fertiliser. It can be made from the reaction between potassium hydroxide and an acid.

Complete the word equation for the reaction, naming the acid used.



2 marks

Maximum 5 marks