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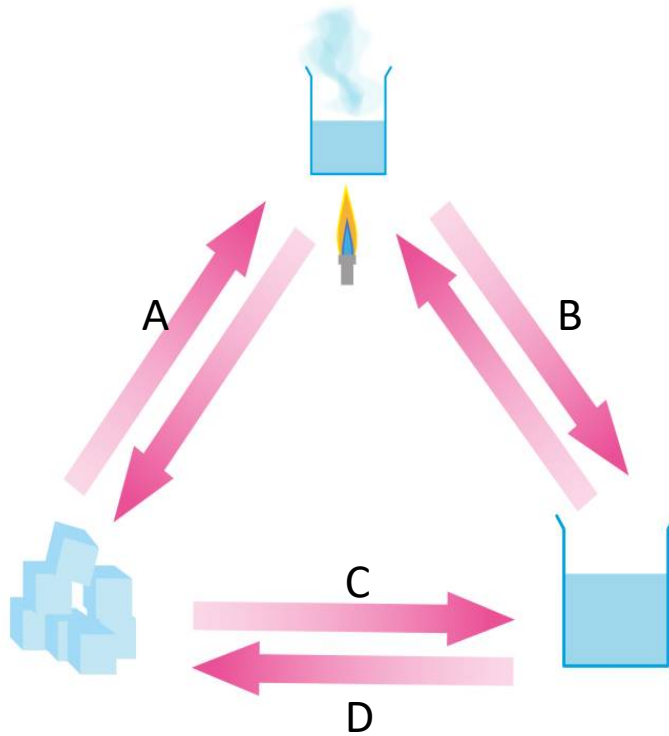
Malvern College Academic Scholarship Examinations 2024

CHEMISTRY

Please read this information before the examination starts:

- It is recommended you spend 20-minutes on this section.
- Answer all questions

Q1. The diagram below shows the changes of state between solid, liquid and gas (the top picture).



a) State the name of the changes A-D

- A _____
- B _____
- C _____
- D _____

[2]

b) The reverse process to B can be called either evaporation or boiling. Explain the difference between the two and give a real world example to demonstrate the difference.

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.....

.....

[3]

Q2

A student is given a beaker of a colourless liquid and is asked to determine whether the liquid is pure water. The student adds anhydrous copper sulphate.

- a) What is the expected colour change when anhydrous copper sulphate is added to water

..... [1]

- b) The student sees the expected colour change and concludes that the colourless liquid must be pure water. Explain why the student's conclusion is incorrect.

.....
..... [1]

- c) Suggest a more appropriate test to prove that the water is pure or not and the expected result.

..... [1]

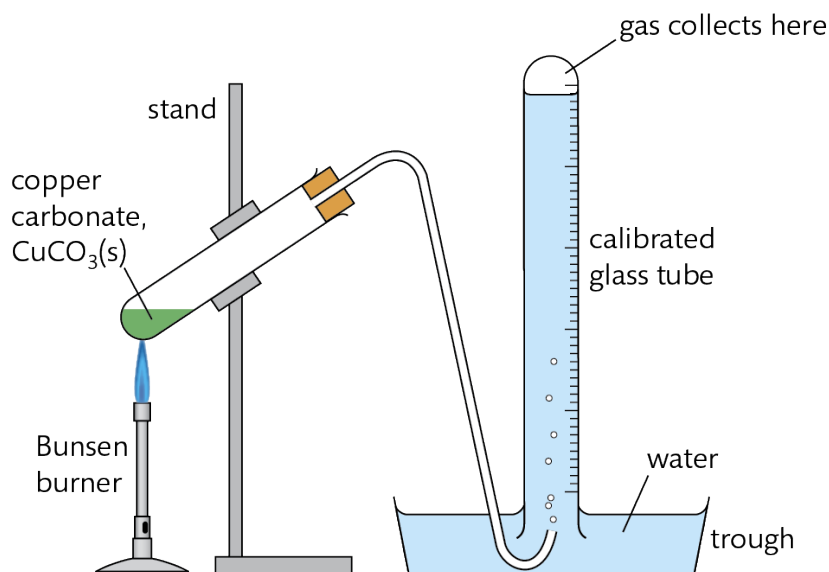
- d) The solution is in fact a mixture of water and salt. State the name of a technique that could be used to obtain pure water from this mixture.

..... [1]

Questions continue over the page

Q3

A student used the equipment shown in the picture below to investigate the decomposition of copper carbonate, CuCO_3 . The process produces carbon dioxide and one other product.



a) State the number of (i) elements and (ii) atoms in copper carbonate

(i) _____

(ii) _____

[2]

b) Describe a test and the expected result to show that the gas produced is carbon dioxide

.....
.....

[2]

c) Deduce the name and formula of the other product

.....
.....

[2]

Questions continue over the page

- d) The set-up shown is not an accurate method to determine the volume of gas that is produced as carbon dioxide can dissolve in water to form carbonic acid, which is a weak acid. Suggest a pH and the colour of universal indicator in a solution of carbonic acid.

pH = Colour of universal indicator =

[2]

- e) The carbonic acid can be reacted with sodium and sodium hydroxide. Sodium is a metal and sodium hydroxide is an alkali. Complete the word equations for the two reactions

Carbonic acid + sodium → sodium carbonate + _____

Carbonic acid + sodium hydroxide → sodium carbonate + _____

[2]

- f) Describe what happens to the pH of the solution as sodium hydroxide is added to the solution of carbonic acid.

.....
.....

[1]



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