To calculate the percentage composition of the mixture of na2co3 + nahco3 essay s...

Science, Chemistry

Aim – To calculate the percentage composition of the mixture of

$Na_2CO_3 + NaHCO_3$

Procedure

1) Weigh a perfectly dry crucible with properly fitted lid.

2) Weigh the crucible with 1 gram of the mixture.

3) Heat the crucible with a partially open lid for 10 minutes with low flame and gradually increase the flame.

4) Keep heating for 30 minutes.

5) Place the crucible to a dessicator.

6) Weigh the cooled crucible and note it down.

Equipment used –

1) Crucible

2) Weighing machine

3) Dessicator

4) Bunsen burner

5) Tripod stand

6) Lighter

7) The mixture

Qualitative analysis –

1) The cooling process was time consuming.

2) When the heating started, there were some fumes evolved.

3) In the middle of the process of heating some orange colour deposits could be seen in the tripod stand.

4) It was hard to keep the lid of the crucible partially open, as it was not balancing perfectly.

5) The crucible turned very hot, thus it was hard to place the crucible in the dessicator.

6) The vaseline wasn’t very sticky, thus the lid of the dessicator wasn’t very tight.

7) Once the crucible was placed inside the dessicator, it was difficult to keep the lid partially open as it was too hot to touch and one had to use holder.

DATA COLLECTION

Attempt

Mass of the crucible + 0. 001g

Mass of the crucible + mixture + 0. 001g

Mass of the mixture + 0. 002g

After Heating, Mass of the crucible + 0. 001g

Mass lost after heating + 0. 002g

1

27. 385

28. 222

0. 837

28. 000

0. 222

2

30. 238

31. 188

0. 950

30. 951

0. 237

DATA PROCESSING

2NaHCO3 —- Na2CO3 + CO2 + H2O

Molar mass of 2NaHCO3 = 168

Molar mass of CO2 + H2O = 44 + 18 = 62

As we know the mass of –

CO2 + H2O = 0. 222 + 0. 002g in the first attempt.

This was calculated by

Mass lost after heating = (Mass of crucible + mixture) – (After heating mass)

This mass loss is the mass of H2O + CO2 which evaporates during the heating process.

Now, to calculate the mass of NaHCO3 can simply be calculated by unitary method as follows –

Let the mass of NaHCO3 be X

168 62

X 0. 222

Therefore X = 0. 602 + 0. 001 g

As we know that the mass of the mixture before heating was 0. 837 + 0. 002g

The percentage composition of NaHCO3 can be calculated as follows –

(0. 602/0. 837)*100 = 71. 9 %

Therefore, the percentage composition of Na2CO3 is 100 – 71. 9 = 28. 1 %

Error propagation

The absolute uncertainty of the masses was + 0. 002g,

Therefore the percentage uncertainties of the masses were calculated as follows –

(0. 002/0. 602) * 100 = 0. 2 % (rounded of to one significant figure)

(0. 002/0. 837) * 100 = 0. 2 % (rounded of to one significant figure)

Therefore, the uncertainty for the final value of NaHCO3 71. 9 + 0. 4%

And Na2CO3 = 28. 1 + 0. 4%

Because the percentage uncertainties are added.

The final answer for the second attempt was =

NaHCO3 = 67. 6 + 0. 3 %

Na2CO3 = 32. 4 + 0. 3%

Conclusion –

My final result would be 30. 25 + 0. 6 % as it is the average of both the attempts made.

The real value of the composition is 30 %

It is quite close and can be concluded that the answer is not exact due to some human errors or impure mixtures.

Evaluation –

1) The answer could have been more accurate and precise if I would have repeated the experiment once more.

2) Could have used better equipment with more precise readings

3) Made sure that the mixture used was pure.