Unit 3 - activity

4 A class of students carried out experiments to determine the value of **x** in the formula of hydrated sodium carbonate, $Na_2CO_3.xH_2O$.

Hydrated sodium carbonate was heated until no more water of crystallisation remained. Anhydrous sodium carbonate, Na_2CO_3, was formed.

$$Na_2CO_3.xH_2O \rightarrow Na_2CO_3 + xH_2O$$

The students were given the following instructions:

- weigh a sample of the hydrated sodium carbonate in a pre-weighed crucible
- heat the crucible containing the sample to remove the water of crystallisation
- allow the crucible to cool and then reweigh the crucible.

(d) The Data Book value for **x** is 10.

One student obtained a value for **x** of 8.63 and another student obtained a value for **x** of 10.79.

Explain the practical errors that could have led to each of these values.

(4)

Question number	Answer		Additional guidance	Mark
4(d)	An explanation that makes reference to:			4
	• 8.63 is too low because not enough water has been removed	(1)	Accept hydrated sodium carbonate has lost water in storage	
	• because it's not been heated long/strongly enough	(1)		
	• 10.79 is too high because apparently too much water has been removed/some extra material has been lost	(1)	Ignore reference to impurities in the sodium carbonate	
	• because solid has been lost from the crucible.	(1)	Do not award measurement errors	