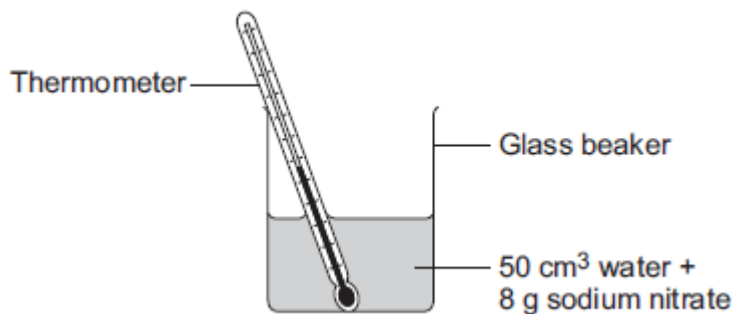


**Q1.**

This question is about temperature changes.

- (a) A student investigated the temperature change when 8 g of sodium nitrate dissolves in 50 cm<sup>3</sup> of water.

The diagram below shows the apparatus the student used.



The student did the experiment five times.

**Table 1** shows the results.

**Table 1**

Experiment	Decrease in temperature of water in °C
1	5.9
2	5.7
3	7.2
4	5.6
5	5.8

- (i) Calculate the mean decrease in temperature.  
Do not use the anomalous result in your calculation.

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Mean decrease in temperature = \_\_\_\_\_ °C

(2)

- (ii) Suggest **one** change in the apparatus in the diagram above which would improve the accuracy of the results.  
Give a reason for your answer.

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- (b) The student investigated the temperature change when different masses of sodium carbonate were added to 50 cm<sup>3</sup> of water at 20 °C.

**Table 2** below shows the results.

**Table 2**

Mass of sodium carbonate in g	Final temperature of solution in °C
2.0	21.5
4.0	23.0
6.0	24.5
8.0	26.0
10.0	26.6
12.0	26.6
14.0	26.6

Describe the relationship between the mass of sodium carbonate added and the final temperature of the solution.

Use values from **Table 2** in your answer.

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(3)  
(Total 7 marks)

## Mark schemes

### Q1.

- (a) (i) 5.75 **or** 5.8

*correct answer with or without working gains 2 marks*  
*correct working showing addition of any four results and*  
*division by 4 gains 1 mark*

**OR**

*6(.04) for 1 mark*

2

- (ii) use a polystyrene cup **or** lid  
*accept insulate the beaker*

1

to prevent energy/heat gain  
*accept to prevent energy/heat transfer*  
*do **not** accept energy/heat loss*

**OR**

use a digital thermometer  
*allow use a data logger*

easier to read (to 0.1°C)

1

- (b) (as mass increases) the final temperature increases

1

then stays constant

1

correct reference to a value above 8 g up to and including 10 g as mass when the trend changes

1

[7]