



4. A student investigates a reaction used in hand warmers, represented above. The student mixes Fe(*s*) with a catalyst and sand in a small open container. The student measures the temperature of the mixture as the reaction proceeds. The data are given in the following table.

Time (min)	Temperature of Mixture (°C)
0	22.0
1	25.1
2	34.6
3	37.3
4	39.7
5	39.4

(a) The mixture (Fe(*s*), catalyst, and sand) has a total mass of 15.0 g and a specific heat capacity of 0.72 J/(g·°C). Calculate the amount of heat absorbed by the mixture from 0 minutes to 4 minutes.

(b) Calculate the mass of Fe(*s*), in grams, that reacted to generate the amount of heat calculated in part (a).

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Use a pencil or pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.
Continue your response to **QUESTION 4** on this page.

(c) In a second experiment, the student uses twice the mass of iron as that calculated in part (b) but the same mass of sand as in the first experiment. Would the maximum temperature reached in the second experiment be greater than, less than, or equal to the maximum temperature in the first experiment? Justify your answer.

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