Checking Reaction Amount From a Heat Record

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A classroom calorimetry model compares two complete runs of the same reaction. The released energy warms only the measured solution. Heat capacity means the energy needed to warm that entire solution by one degree Celsius.

Run	Amount reacted (mol)	Solution heat capacity (kJ/°C)	Temperature rise (°C)
P	0.010	0.020	4.0
Q	0.020	0.040	4.0

1 Which solution gains more energy in the recorded runs?

(1) P only

(2) Q only

(3) Both gain the same energy.

(4) Neither gains energy.

2 Calculate the energy gained per mole reacted in each run. Use both the heat and amount records. [1]

Answer and work

A repeat uses a solution with heat capacity 0.040 kJ/°C and warms by 3.0 °C. The model assumes the same energy released per mole reacted and no energy loss.

3 Estimate the amount that reacted in the repeat. Show how the heat reading enters the calculation. [1]

Answer and work

4 Explain why the same estimate would be too low if some released energy escaped to the surroundings. [1]

Answer and work