Comparing Base Use for Two Model Acids

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

A class compares two model molecular acids. Each P molecule can transfer one proton to a base. The class tests whether each Q molecule can transfer one or two protons. The model uses one OH^- ion per proton removed and tracks when the first proton per molecule has been removed separately from the point of complete neutralization.

Sample	**Amount of acid (mmol)**	**OH^- used at first-proton point (mmol)**	**OH^- used at complete neutralization (mmol)**
P	4	4	4
Q	4	4	8

1 Which interpretation of Q fits its separate test?

(1) Each Q molecule transfers no protons.

(2) Each Q molecule transfers one proton.

(3) Each Q molecule transfers two protons.

(4) Each Q molecule transfers four protons.

2 Explain why the first-proton point by itself would fail to distinguish the two model acids. [1]

Answer and work

The class compares another P sample containing 8 mmol of P with a Q sample containing 4 mmol of Q.

3 Predict the total amount of OH^- used for complete neutralization of each new sample. Show your work. [1]

Answer and work

4 A student measures only the final amounts and calls the new samples identical. Identify an earlier reading that could distinguish them and predict its value for each sample. [1]

Answer and work