Checking What a Clumping Step Removes

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

A rinse-water model contains 8 mg of suspended mineral and 3 mg of dissolved dye in each starting sample. A filter holds some solid particles back. Dissolved dye passes through in the model. The class measures each substance separately in the water that passes through. The clumping step joins mineral particles into larger clusters without changing the amount of mineral or dye.

Treatment	**Suspended mineral that passes (mg)**	**Dissolved dye that passes (mg)**
Coarse filter only	6	3
Fine filter only	2	3
Clumping step, then coarse filter	1	3

1 Which treatment leaves the least suspended mineral in the collected water?

(1) Coarse filter only

(2) Fine filter only

(3) Clumping step, then coarse filter

(4) The three leave equal mineral amounts

2 Compare the amount of suspended mineral missing from the collected water with and without clumping before the coarse filter. [1]

Answer and work

3 Use the coarse-filter comparison to explain why making larger mineral clusters can change the amount that passes. [1]

Answer and work

4 A student claims the clumping step removes dissolved dye along with mineral. Evaluate the claim using the measured amounts. [1]

Answer and work

A repeat finds 2 mg of mineral settled in the holding cup before the liquid reached the coarse filter. The collected water still contains 1 mg of mineral. Assume the remaining mineral is on the filter.

5 Calculate the amount of mineral caught by the filter in the repeat. Explain why assigning all the missing mineral to the filter would be incorrect. [1]

Answer and work