Checking Two Filters in One Light Path

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

A lamp sends 100 units of light in band A and 100 units in band B toward two filter sheets. A sheet passes the stated fraction of the light reaching it in each band. In the independent-filter model, stacking sheets does not change either sheet’s own fraction.

Filter	Fraction of band A passed	Fraction of band B passed
P	0.80	0.50
Q	0.50	0.80

1 With P first and Q second, how much band A light reaches Q?

(1) 20 units

(2) 40 units

(3) 50 units

(4) 80 units

2 Calculate the amount of each band reaching the detector after both sheets. [1]

Answer and work

3 A student says putting Q first will make band B brighter at the detector. Evaluate the claim in the independent-filter model. [1]

Answer and work

A stack trial gives 40 units in band A and 30 units in band B. A lamp check verifies the original input, and each sheet still gives the listed readings when tested by itself.

4 Which part of the stack result conflicts with the independent-filter model? Explain why the final reading alone cannot locate the discrepancy within the stack. [1]

Answer and work

The class adds a probe between P and Q. The probe does not change the light path. It records 50 band B units reaching Q while the final detector still records 30.

5 Calculate the fraction of the incoming band B light that gets past the second stage. Use it to identify where the measured light differs from the model. [1]

Answer and work