Comparing Dye Changes After Light Pulses

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

A class models the fading of a dye under light. Three equal samples start with a color reading of 100 units. The same wavelength reaches each sample. During each pulse the power stays constant. A power of 1 mW delivers 1 mJ of energy per second.

Trial	Power during pulse (mW)	Pulse duration (s)	Color reading after pulse
J	2.0	3.0	80
K	6.0	1.0	80
L	2.0	6.0	65

1 Which two trials deliver equal light energy at different powers?

(1) J and K

(2) J and L

(3) K and L

(4) All three trials

2 Calculate the light energy delivered in L. Show how the duration affects the result. [1]

Answer and work

The students want to know whether peak power alone can explain the color readings. In each trial the listed power is the highest power during the pulse.

3 Use J and L to evaluate the idea that the same peak power always gives the same final color reading. [1]

Answer and work

4 Describe a second equal-energy comparison that would test whether the result for J and K also holds at a different total energy. [1]

Answer and work