Dilution and Solute Conservation

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

When only solvent is added, the amount of solute in the sample stays constant. Use $M_1V_1 = M_2V_2$, with both volumes in the same units.

1 What is the concentration after 40.0 mL of 0.500 M solution is diluted to a final volume of 100.0 mL?

(1) 0.125 M

(2) 0.200 M

(3) 0.500 M

(4) 1.25 M

2 What volume of 1.20 M stock solution is required to make 250. mL of 0.240 M solution? Show your setup. [1]

Answer and work

3 Explain why a solute can have a lower molarity after dilution even though the number of solute particles stays the same. [1]

Answer and work

4 Which volume should be used for V_2 when making a dilution?

(1) The final solution volume

(2) The original stock volume in its bottle

(3) The volume of pure solvent added

(4) The stock sample volume before dilution

Dye Standards for a Colorimeter

Use the information below to answer the questions.

A class uses 0.120 M stock dye to make colorimeter standards. Each standard starts with a fresh sample from the same stock. The dye does not react with the solvent.

Standard	Stock sample (mL)	Final solution (mL)
P	10.0	60.0
Q	15.0	60.0
R	15.0	90.0

5 Which standard has the greatest dye molarity?

(1) P

(2) Q

(3) R

(4) All have the same dye molarity.

6 Calculate the dye molarity of standard R. [1]

Answer and work

7 Do Q and R contain the same amount of dye in moles? Use the preparation data to explain. [1]

Answer and work

8 Which pair has the same final molarity but different final volumes?

(1) P and Q

(2) P and R

(3) Q and R

(4) All three