

There is 1l acidic solution with pH=2. What volume of water should be added to this solution to increase pH by three?

$$\text{pH} = -\log[\text{H}^+]$$

if pH =2, $[\text{H}^+] = 0.01$ and if pH =3, $[\text{H}^+] = 0.001$

Concentration is amount of substance in one liter, so if volume is 1l and pH =2 , amount is 0.01.

Amount is constant and water has is changeable value. New concentration is 0.001 it means that it is 0.001 mol in one liter, but you have 0.01 mol, so you can prepare :

$0.01 / 0.001 = 10$ liter of 0.001M solution, but you have already 1l (acidic solution with pH=2), so you have to put **9 L**

Volume of water that should be added to 700 ml solution to make its concentration 1/5 times

Let's beginning concentration is X, than final concentration is X/5 or 0.2X.

Amount is constant and water has is changeable value.

$$\text{Amount is } X * 0,7 = 0,7X$$

$$0,7X / (0,7 + Y) = 0,2X$$

$$1 / (0,7 + Y) = 0,2X / 0,7X$$

$$1 / (0,7 + Y) = 0,286$$

$$1 = 0,286 * (0,7 + Y)$$

$$1 = 0,2002 + 0,286Y$$

$$0,7998 = 0,286Y$$

$$Y = \mathbf{2,8 L}$$