

First we will understand the terms used in these type of questions.

Solution → Solution is the mixture of two or more substances or elements.

That is , if you mix two or more things, you will get a solution or mixture.

Concentration → Perfect definition for concentration is , “ How much of a given substance is mixed with another substance or solution.”

In simple words, it means, what is the percentage of the certain substance in the whole solution or mixtures.

To understand, these words, I will give you an example to relate.

Have you prepared any juice as such....

Say, a lemon juice.....

What we will do?

First we will squeeze the lemon and we will get the undiluted juice from it ----> (1)

Then we will mix it with water ----(2)

Then, we will add sugar or honey for taste --- (3)

If we put (1) , (2) and (3) together....say,

Undiluted juice + water + sugar or honey = Lemon Juice.....

So, all these in the left hand side are said to be the Substances or elements and the lemon juice is the solution or the mixture.

Therefore, All substances put together = Solution (or) Mixture.

Hence, the key point here is , If you add the values for all the substance, you will get the value of solution or mixture.

Now , let's use the same example to understand the term “concentration”

Usually, we will find the concentration for the substance other than water.

So, in the above case, if the Undiluted juice and honey is 50cc and water is 30cc. Then what is the concentration of the solution.

(Undiluted juice + sugar) + water = Solution

50cc + 30cc = 80cc

Therefore, concentration will be, the concentration for the substance other than water

as I told in the first few lines of concentration, it is just the % of the substance with the whole solution.

So, here, it will be $(50/80) * 100 = 62.5\%$

These are the basic things that will be used in these type of questions, so, I will explain you with the help of the questions in the review tests and advance practice test.

Question 1 : “30cc of acid is mixed with 150cc of water. 60cc of this solution is mixed with 40cc water. What is the concentration of the new solution?”

We know,

Acid + Water = Solution

$30\text{ cc} + 150\text{ cc} = 180\text{ cc}$

From 180cc, 60cc is mixed with 40 cc of water

So, the new solution will be

$60\text{cc} + 40\text{cc} = 100\text{cc}$

Now we need to find the concentration of the new solution, as we know, concentration is the % of the substance other than water on the total solution.

So, it must be $(60/100)*100$, but in this case, we should not do that, because, this 60cc contains water (as it is taken from 180cc) . Do you agree?

So, find out what is the concentration in that 60cc

In the old solution ($30\text{ cc} + 150\text{ cc} = 180\text{ cc}$)

180 cc has 30cc

$60\text{cc} = (30 * 60)/180 = 10\text{cc}$

Therefore, the new solution is of the form

$10\text{cc acid} + 50\text{cc water} + 40\text{ cc water} = 100\text{ cc}$

Therefore , concentration of the new solution = $(10/100)*100 = 10\%$

Question 2 : “Betty poured 40 gm water on to 10 gm of salt. Her actual intention was to make a 40% solution. She needs to set this right, but she has no more salt. Which of the following will Betty need to do?”

- 1.Add another 40 gm water
- 2.Discard 25 gms of the solution
- 3.Heat the solution till it weighs 25 gms.
- 4.Heat the solution till it weighs 40 gms.

Here, the substances and solution are

Water + Salt = Solution
 $40\text{ gm} + 10\text{ gm} = 50\text{ gm}$

Betty's actual intention was 40% of the solution.

It means, % concentration of the substance other than water to the total solution = 40%

Since she doesn't have salt to increase the 10gm, the water should be taken out to make that 10gm as 40%

So, how much water should be taken out....

So, let's find the actual gm for water , with the help of concentration %

$$(\text{Salt} / \text{Total solution}) * 100 = 40$$

Salt, we know it is 10gm

$$\text{Total solution} = \text{Salt} + \text{water} = 10 + x$$

$$[10/(10+x)] * 100 = 40$$

$$10/(10 + x) = 40/100$$

$$1000 = 400 + 40x$$

$$600 = 40x$$

$$x = 15$$

There fore, it should be ideally 15gm of water should be there

So, $40\text{ gm} - 15\text{ gm} = 25\text{gm}$ must be taken out.

Therefore, option 3 is correct → Heat the solution till it weighs 25 gms. (which is 15gm of water + 10 gm of salt).

Hope you are clear.

Note : These questions are rare to appear.