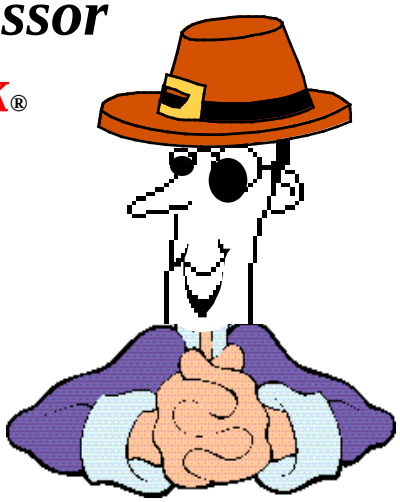
The Penetrant Professor from Met-L-Chek®



WATER CONTENT IN PENETRANT

Everyone who uses water washable penetrants understands that the specifications require that the penetrant have less than 5 percent water content. Periodic tests are made to certify that the in use penetrant meets this criterion. So, suppose that you receive a report that the water content of your penetrant is over the 5 percent limit, and your penetrant tank holds something like 200 gallons. **What do you do?** Of course, you could dispose of the material in the tank and recharge it with fresh penetrant. But the better solution is to add sufficient fresh penetrant to dilute the water to the point where the water concentration is below 5 percent.

This idea makes sense, but one needs to know how to calculate the amount of fresh penetrant that is required. Hit or miss does not work very well, or, at least, is not dependable, in order to get it right. We will give an example of how this is correctly done.

In this example, suppose that the tank holds 200 gallons, and the water content measures to be 7 percent. We need to know how much fresh penetrant to add to bring the water percentage to , let's say, 4 percent.

First, let us calculate how much water is in the tank. This is easy. There are 200 gallons of penetrant containing the water, and the percentage is 7 percent. Seven percent of 200 gallons is 14 gallons.

We want to adjust the amount of penetrant in the tank so that the water percentage drops to 4 percent. So the question is, **"How much fresh penetrant must be added?"** The answer is that the total amount in the tank must be sufficient that 14 gallons of water is only 4 percent of the total liquid in the tank. We will designate X as the total amount of liquid in the tank. Mathematically, the equation is

100 times 14 divided by X equals 4 percent, or 100(4)/X=4. We can solve for X by multiplying both sides of the equation by X, then getting

Happy Thanksgiving

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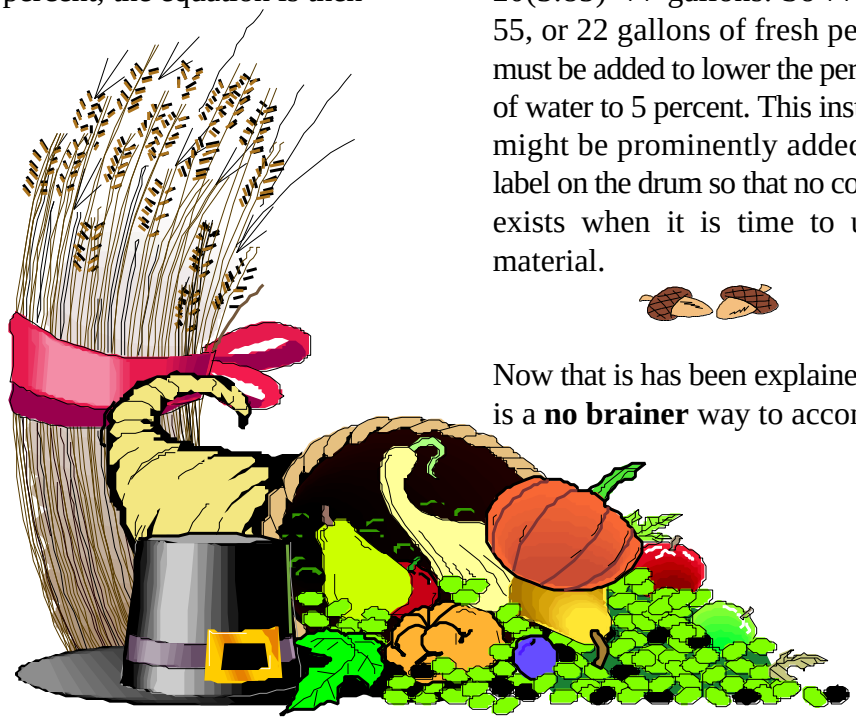
100(14)=4X, or X=100(14)/4, and finally X= 25(14) = 350 gallons. This answer is the total amount that must be in the tank. Since there is already 200 gallons in the tank, one must add 350 minus 200, or **150 gallons** of fresh penetrant.

In this example, the tank may not be able to hold 350 gallons. So let us calculate how much penetrant must be added to reach the specification limits of 5 percent. Going through the calculation yields 100(14)=5X, or X=20(14) =280 gallons. So now the amount that needs to be added drops to 80 gallons, which might be more easily accommodated.

Suppose that even adding 80 gallons is out of the question, because the tank is too small. In this case, you can be creative. Suppose that you remove 55 gallons (one drum) of the penetrant from the tank, leaving 145 gallons in the tank that contains 7 percent water. Now there is 145 gallons at 7 percent or 10.15 gallons of water in the tank. If we want to reduce the water to 5 percent, the equation is then



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100(10.15)=5X, and x=10(10.15) =203 gallons total in the tank. There is 145 gallons in the tank, so 203 minus 145 equal 58 gallons. In this example, a drum of penetrant was removed from the tank, and a drum of fresh penetrant, plus 3 gallons, was added to reduce the water to 5 percent. One must be very careful to label the drum of penetrant that has 7 percent water in it so that it does not become confused with fresh penetrant. The contents of this drum must also be adjusted, and this can be done as follows:

The drum contains 7 percent of 55 gallons, or 3.85 gallons of water. To reduce this to 5 percent, the equation is 100(3.85)=5X, and X= 20(3.85)=77 gallons. So 77 minus 55, or 22 gallons of fresh penetrant must be added to lower the percentage of water to 5 percent. This instruction might be prominently added to the label on the drum so that no confusion exists when it is time to use the material.

Now that is has been explained, there is a **no brainer** way to accomplish what needs to be done, and it requires no calculations at all. It is like using a hammer instead of a scalpel, but it works and it works well. Suppose that the tank holds 200 gallons of penetrant that has 7 percent water in it. Just add an equal amount of fresh penetrant, and the percent water drops in half, to 3,5 percent. If the tank will not hold 400 gallons, take out 100 gallons and add 100 gallons of fresh material. Then, when the tank needs to be replenished, for every gallon of the 7 percent water laden penetrant that is added, also add a gallon of fresh penetrant. This is done, and is easy.

We all learned, at an early age, that "An ounce of prevention is worth a pound of cure." So the best advice with regard to water content is to keep the water out of the penetrant. The monthly laboratory check on water content should be closely watched. If you see signs that the water content is going up, look to see what might be causing this and correct it. Being diligent can save the chore of trying to correct the problem, if it occurs.

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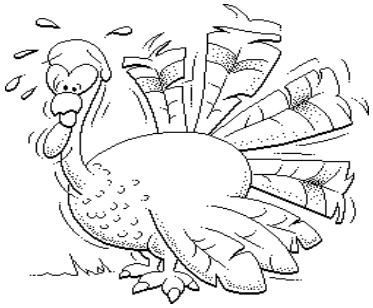

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