

Re: Burette/Thermom. Readings – Rounding?

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On Wed, 29 Dec 2004 03:14:57 GMT, B <noemail@noemail.noemail> wrote:

>Hello!

>Got a problem below which has been troubling me for a few days...

>

>I realised I don't know how to round values from thermometers, burettes

>etc. if the measurement is inbetween the divisions but you have to

>(because the teacher has said so) have a value which is ± 0.05 i.e. the

>last digit / 2nd d.p ends in 0 or 5 e.g. 25.05cm³, 13.20cm³ are

>acceptable, 25.04cm³ are NOT. ---

>

>If one has to measure a reading on a burette to 0.05 i.e. the last 2nd

>decimal place number must be a 0 or a 5, but the burette only has

>divisions every 0.1ml, e.g. 20.0, 20.1, 20.2, then where does one apply

>the 20.5 reading?

>

>I have heard of a number of different approaches from various people,

>and was wondering if the chemists here could offer a definitive opinion.

>:) [The following examples assume that the bottom of the meniscus is

>between the divisions e.g. 20.0 and 20.1cm³] N.B. I have ignored the

>fact that burettes have their numbers from top down to bottom :)

>

>Approach A] If the bottom of the meniscus is "below" halfway between the

>divisions, then you round DOWN to 20.00; else if it is above the halfway

>point, you round DOWN to 20.05 cm³.

>However, another approach suggested by some is: B] If the bottom of the

>meniscus is "below" halfway between the divisions, then you round UP to

>20.05; else if it is above the halfway point (i.e. in the upper half of the

>region between marked divisions on the burette), you round UP to 20.10 cm³.

>

>Another approach (we'll call it approach C) I have heard is to split the

>area between 20.0 and 20.1 – i.e. between the divisions – into 3 regions

>(mentally that is) i.e. in the lower 1/3 you assume that the value is

>20.00, in the middle 1/3 you assume that the value is 20.05, in the

>uppermost 1/3, you assume the value is 20.10.

>

>Last but not least, another approach (which I think is a tad

>inaccurate), that I have heard from many is the following rule: If it is

sci.chem: Re: Burette/Thermom. Readings – Rounding?

>on the division / line itself, it's 20.00 or 20.10 etc. If it isn't on
>the line, then it's 20.05,20.15 etc. regardless of how close it may be
>to the upper or lower regions inbetween the divisions.
>
>If you've read this, thanks, you've got a lot of patience :-)
>
>Thus, I would be **most grateful** if anyone could tell me which one of
>these approaches is "official" or the one to use in labs (at least, for
>secondary school labs; I'm not at uni btw, so erm... I'm not after
>complicated answers, thanks :)).

As you suggest, there is a lot of personal taste involved here. The best answer is to do it the way a particular teacher wants you to -- and see if you can get that person to explain why they want it.

I'm not sure I like any of the options you suggest above -- though perhaps that is due to the difficulty of describing them in words. I would say... You have decided to read to the nearest 5 in the last place. So you judge which 0 or 5 it is _closest_ to.

But I do not particularly like the idea of reading to nearest 5, in general. You should estimate one digit beyond what the lines show, as best you can. That is typically to the tenth of a division, though of course it varies with the scale. Rounding to nearest 5 is throwing away information, and in general throwing away info is not so good.

bob