Practice on Significant Figures

What are Significant Figures?

Most observations in chemistry are made through the use of some type of instrument; this instrument may be a ruler, a buret, or a spectrometer. In each case, the instrument (with the scientist) has some characteristic precision that depends on the instrument and the skill of the scientist making that observation. The significant figures or digits are therefore the numbers in the datum that have been arrived at through observation and use of the instrument.

The significant figures in a measurement include the certain digits, or digits which the scientist can state are accurate without question, and one uncertain digit, or digit which has some possibility of error. For example, in the measurement 12.34 mL, 12.3 would be the certain digits, and the hundreths place (the 4) is the uncertain digit. This measurement could also be interpreted as 12.34 mL $\pm$0.01 mL; the actual measurement could be as low as 12.33 mL or as high as 12.35 mL.

Which Digits are Significant?

The following is a list of rules with some practice exercises to help you determine which digits are significant.

1. Any nonzero digit is significant.

Practice: How many significant figures are in 12.34 mL?

- ○ 1
- ○ 2
- ○ 3
- ○ 4

Check Answer | Clear

Practice: How many significant figures are in 697 g?

- ○ 1
- ○ 2
- ○ 3
- ○ 4

Check Answer | Clear

Practice: How many significant figures are in 4 nm?

- ○ 0
- ○ 1
- ○ 2
- ○ 3

Check Answer | Clear

2. Zeroes between nonzero digits are significant.

Practice: How many significant figures are in 10.03 mL?

- ○ 1
- ○ 2
- ○ 3
- ○ 4

Check Answer | Clear

Practice: How many significant figures are in 690087 cm?

- ○ 4
- ○ 5
- ○ 6
- ○ 7

Check Answer | Clear

Practice: How many significant figures are in 1.0042 g?

- ○ 2
- ○ 3
- ○ 4
- ○ 5

Check Answer | Clear

3. Zeroes used solely to fix the decimal point are not significant. To determine whether a zero is used as a place holder, write the number without the zero; if the number changes, (like 250 to 25), the zero is not significant. Note that the practice of one zero before the decimal point in a number less than one is a scientific convention and does NOT represent a significant digit. Hence, 0.12 has two significant figures.(If one wishes to state that a zero that is used as a place holder is significant, a bar may be placed over the rightmost significant digit.)

Practice: How many significant figures are in 15200 mL?

- ○ 2
- ○ 3
- ○ 4
- ○ 5

Check Answer Clear

Practice: How many significant figures are in 0.0087 cm?

- ○ 2
- ○ 3
- ○ 4
- ○ 5

Check Answer Clear

Practice: How many significant figures are in 0.00402 g?

- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6

Check Answer Clear

Practice: How many significant figures are in 104200 mL?

- ○ 3
- ○ 4
- ○ 5
- ○ 6

Check Answer Clear

4. Zeroes to the right of the decimal point and to the right of nonzero digits are significant. Note that these digits are not necessary to fix the decimal point; they are there specifically to indicate that these digits were measured.

Practice: How many significant figures are in 42.00 mL?

- ○ 2
- ○ 3
- ○ 4
- ○ 5

Check Answer Clear

Practice: How many significant figures are in 0.0010300 cm?

- ○ 2
- ○ 5
- ○ 7
- ○ 8

Check Answer Clear

Practice: How many significant figures are in 103.00 g?

- ○ 2
- ○ 3
- ○ 4
- ○ 5

Check Answer Clear

Practice: How many significant figures are in 20.00 g?

- ○ 1
- ○ 2
- ○ 3
- ○ 4

Check Answer Clear

5. Counting numbers and exact numbers(12 in a dozen, 1000 mL in a L) have an infinite number of significant digits; there is no chance, for example, that 12 eggs is 11.5 or 12.3 - we know there are always 12 in a dozen.

Using Significant Figures in Operations

Send all comments, questions, suggestions, or request for noncommercial use to sdana@mail.mcps.org