

Fundamentals of Chemistry Tests

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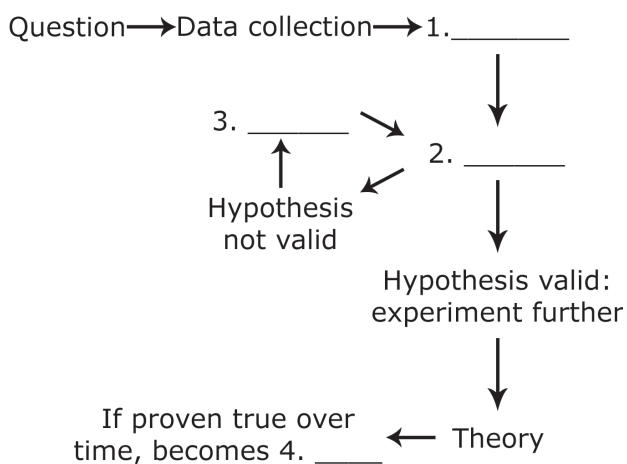
These tests are purposely designed to be in-depth knowledge assessment tools. As such, they are fairly long, so please do not be intimidated! Essay or short answer-type questions are the best way to identify if your student completely understands the material. It is perfectly acceptable, if you choose, to have your student answer only the even questions, only the odd questions, or every third question as you see fit for your student's need. If they are able to correctly answer the majority of questions asked, it is likely they understand all of the material very well. If your student answers questions better orally, please ask them that way, rather than having them write it out. The method of test taking should not be a stumbling block in your student's performance. **Note that for all tests, students should have free access to the Periodic Table of Elements. Additionally, you can decide if your student can use the book for reference (i.e. an "open book" test). There are many times in chemistry when a student knows how to use information but has not memorized 100% of the material and reference values (and that's OK for this introductory course!). The goal of open book type testing is NOT to give the student unlimited time to complete the test, but to give a limited amount of time so that the student only uses the book when needed as a reference, rather than checking every single answer.**

FUNDAMENTALS OF CHEMISTRY TEST #1

1. **Fill in the blanks:** Chemistry is a science that deals with the _____, structure and properties of _____ and the _____ that they undergo. Word list (not all are used): tool, philosophy, origin, composition, transformations, mechanical, substances, maturations.
2. Are atoms made from molecules or are molecules made from atoms?
3. **True or False?** One of the topics of study in chemistry is the change, or changes, that occur to substances when they come in contact with one another.
4. What is another term for "burning"?
5. You are a chemist who studies how atoms and the particles of which they are composed—protons, neutrons and electrons—interact with one another. In which branch of chemistry do you specialize?

6. Although phlogiston turned out to not be a real element and alchemy is no longer main-line science, what did we learn from investigating its history?

7. Fill in the appropriate activities that are missing from this diagram of the scientific method. Activities to choose from are: collect subjective-only data; develop hypothesis; throw out data that are not consistent with hypothesis; experiment; re-state hypothesis if needed; law.

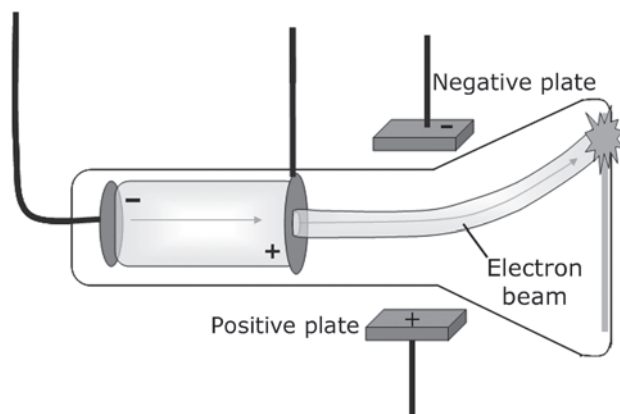


8. **True or False?** When a theory has proven true again and again, it is considered a hypothesis.
9. **True or False?** Since it is good to be an individual with independent thought, standardizing scientific processes is not desirable because it dampens intellectual curiosity.
10. **Fill in the blanks.** In science, _____, or _____, data are preferred over _____, or _____, data. Word list (not all are used): subjective, analytical, quantitative, objective, tactile, qualitative.
11. Why is rare to collect scientific data by smelling, tasting and touching these days?
12. **True or False?** One reason that use of the imperial and USC system is so easy is that the measurements with the same names always contain the exact same amount of matter (so, 1 USC gallon contains the same amount as 1 imperial gallon).

13. **True or False?** One of the benefits of the SI system is that, no matter the measurement, it is a base 10 system, which makes it very easy to use.
14. Which of these units are NOT SI base units? Inch, kelvin, second, pascal, meter, pound, candela, kilogram, ampere.
15. What are the SI units called that are combinations of, or calculations from, base units?
16. Put the following numbers in proper scientific notation.
- 0.000127
 - 5,672,198.359
 - 0.0000000737
 - 19,760,003,261,774
17. Choose the statements that are true.
- $15\text{mm} = 1.5 \times 10^{-2}\text{m}$
 - $200\text{Gs} = 2,000\text{ks}$
 - $1\text{dPa} = 10\text{cPa}$
 - $1\ \mu\text{a}$ is larger than 100Ma
 - 1Hz is larger than 100cHz
18. What is the difference between accuracy and precision?
19. **True or False?** Every measuring tool that is precise is automatically accurate.
20. Match the unit abbreviation to the quantity it measures. (For example, "in" is the abbreviation for the unit that measures ASC distance).
- | | |
|-------------------|------------------------|
| a. °C | 1. time |
| b. m ³ | 2. pressure |
| c. Pa | 3. temperature |
| d. s | 4. electrical charge |
| e. kg | 5. amount of substance |
| f. C | 6. mass |
| g. mol | 7. volume |

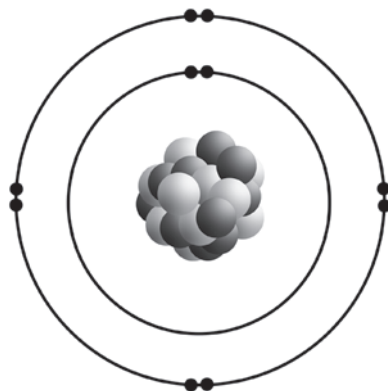
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21. **True or False?** Even though John Dalton's atomic theory has been modified a little bit, it remains the fundamental explanation of "how matter is built."
22. **True or False?** Even though electrons are $1/1867$ times smaller than protons, the magnitude of the electron's charge is equal to that of the proton.
23. Do you agree with the way I drew the diagram depicting what was found during JJ Thomson's cathode ray tube experiment? Why or why not?



24. Identify the particles that attract each other based upon their charge.

● = Neutron ● = Proton ● = Electron



25. What is the strong force (strong nuclear force)?

26. In the Rutherford gold foil experiment, what was the significance of the occasional alpha particle getting deflected by the gold foil rather than passing all the way through?
27. What is the formula for determining the number of electrons an orbital can hold?
28. Draw the Bohr model, with the element's symbol in the nucleus, for the following elements: phosphorus, helium and nitrogen (you can obviously use the Periodic Table for reference).
29. **True or False?** The electron cloud model is another way to diagram an atom where the "cloud" around the nucleus represents the three-dimensional space the electrons occupy because they don't revolve around the nucleus in tight rings as we see in the Bohr diagram.