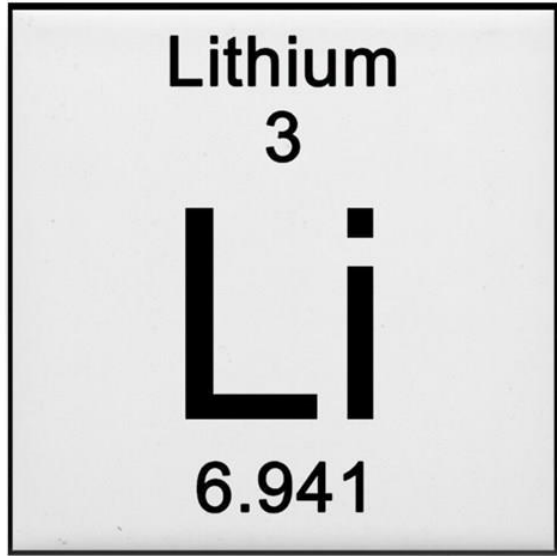
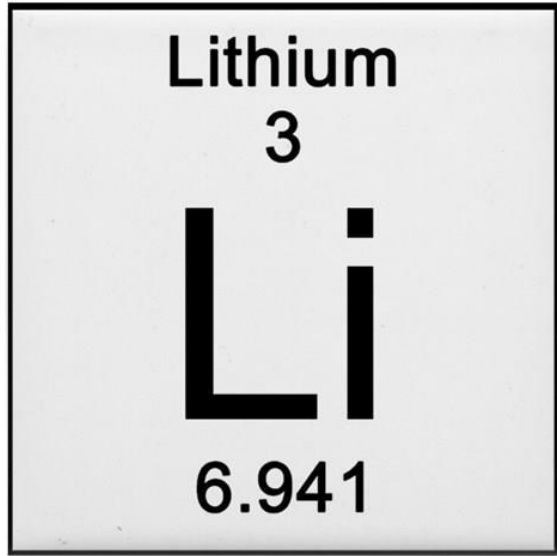


SCIENCE REVIEW

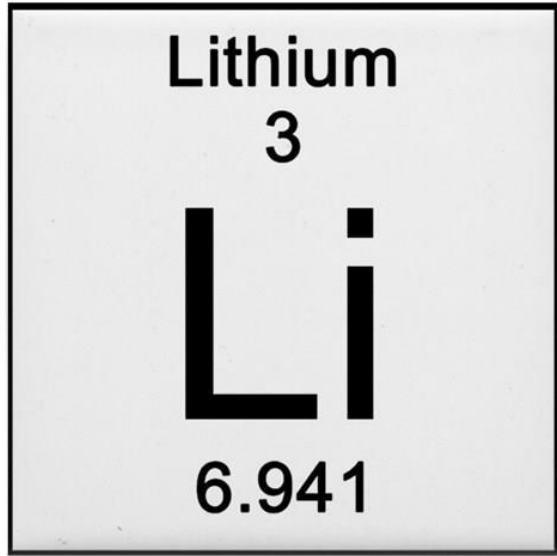
Chemistry, Biology, a little bit of Physics, Experimental Design



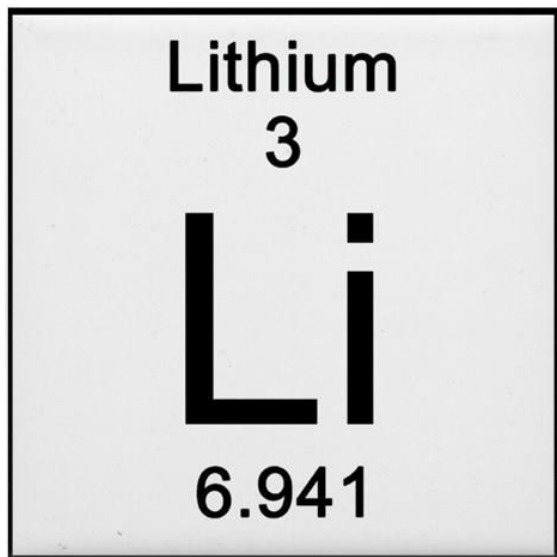
1. How many protons in an atom of Lithium?



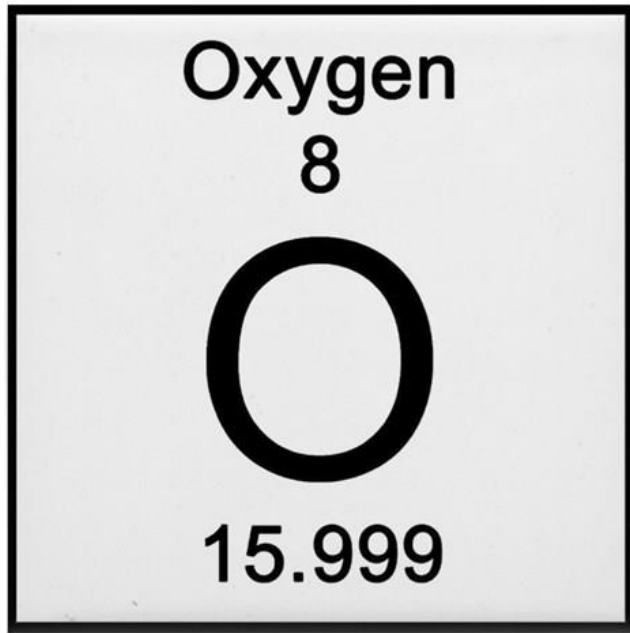
2. How many Neutrons in an atom of Lithium?



3. How many Electrons in an atom of Lithium?



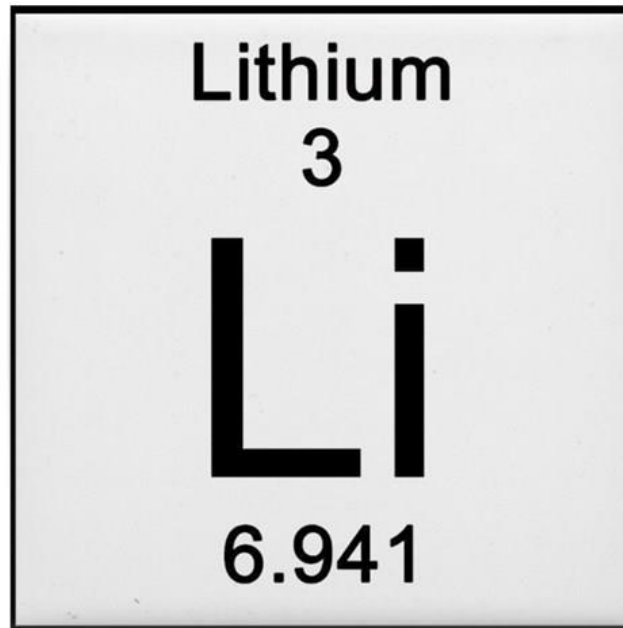
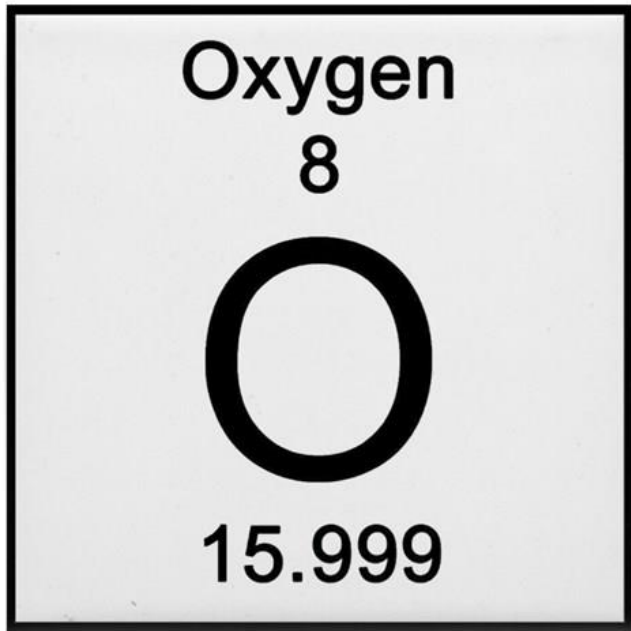
4. How many Valence Electrons in an atom of Lithium?



5. How many protons, neutrons and electrons in an atom of O-18?

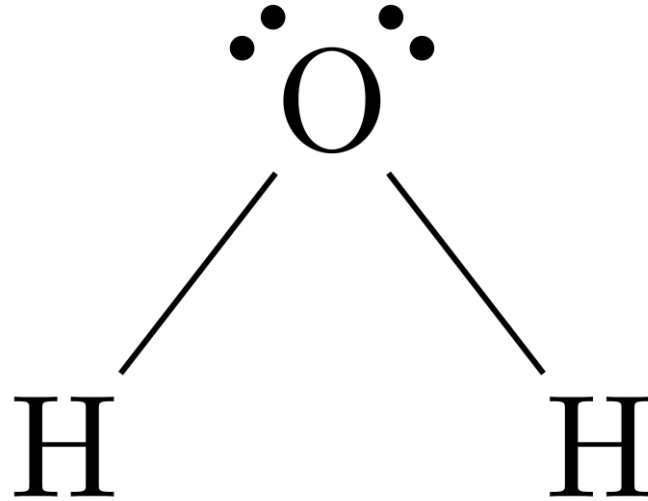
- Protons =
- Neutrons =
- Electrons =

6. Write the molecular formula for the compound formed when Li and O bond. What type of bond is this?



7. What is another term for an ionic compound?

8. What kind of bond holds this molecule together?



9. How does the bond in the water molecule differ from the bond joining Li and O?

10. Is a water molecule charged overall?
Does it have charged regions?

11. Which atoms in a water molecule are positively charged? Which atoms are negatively charged?

12. What is the name for a neutral molecule with oppositely charged ends?

13. Due to the charged regions in a water molecule, water molecules are attracted to each other. What is the name for these forces of attraction between neighboring molecules?

14. What is the maximum number of water molecules that could hydrogen bond around a single water molecule?

15. List three properties that result from water being able to hydrogen bond to other molecules.

16. In a sample of pure water (pH = 7) there would be H_2O molecules as well as 2 other substances. What are the other 2 substances and what is the concentration of each relative to the other in the sample?

17. Complete the sentence: Acids are substances that donate _____ to solutions and _____ the pH.

18. Complete the sentence: Bases are substances that remove _____ from solutions, often by donating _____ to the solution. They _____ the pH of the solution.

19. A solution with a pH of 4 has _____
times _____ H^+ than a solution with a pH of
7.

20. What are the 6 most common elements found in living organisms?

21. All organic compounds contain at least one, and usually 2 atoms of _____.

22. There are 4 classes of organic macromolecules common to all life. List them?

23. Molecules in most of the major classes of organic macromolecules consist of polymers made up of monomers. List the corresponding monomer for each class of organic macromolecule that does form polymers.

24. Write the balanced chemical equation for photosynthesis.

If a plant in a sealed container has 60 grams of CO_2 available and an abundance of H_2O , what is the maximum amount of glucose it could produce using this CO_2 ?

25. Where does photosynthesis occur in eukaryotic plant cells.

26. Other than plants, name 2 other groups of organisms that are capable of photosynthesis?

27. What is the term for any organism that is capable of feeding itself through either photosynthesis or chemosynthesis?

28. Write the balanced equation for the process that allows cells to convert the energy stored in the bonds of organic molecules into a form more appropriate for directly powering cellular work.

29. Where does cell respiration occur in eukaryotic cells?

30. Imagine an oak seedling with a dry weight of only a few grams growing into a mature oak tree with a dry weight of several tons. What makes up the majority of this mass and where did it come from? (exclude water weight from consideration in this question)

31. Picture turning on a light. You flip the switch and electricity flows to the bulb which produces light. The longer you leave the light on the hotter the bulb gets. How does this example demonstrate the first law of thermodynamics?

32. Picture turning on a light. You flip the switch and electricity flows to the bulb which produces light. The longer you leave the light on the hotter the bulb gets. How does this example demonstrate the 2nd law of thermodynamics?

33. How much energy is used by five, 100 watt light bulbs if they are on for 10 hours? Express your answer in kilowatt-hours.

34. Why can solar energy pass through the atmosphere relatively easily, while energy emitted from earth's surface is often reflected back to earth? (the greenhouse effect)

An environmental scientist wants to know if a certain toxin found in a stream is a carcinogen to the fish in the stream. She starts with ten groups of twenty fish each. She exposes each group to a different level of the suspected carcinogen and then determines the number of fish that develop tumors in each group. Throughout the experiment she keeps the water temperature in all fish tanks at the same temperature and ensures that all fish are of the same age.

35. Which variable is the independent variable and on what axis would it normally be graphed?

An environmental scientist wants to know if a certain toxin found in a stream is a carcinogen to the fish in the stream. She starts with ten groups of twenty fish each. She exposes each group to a different level of the suspected carcinogen and then determines the number of fish that develop tumors in each group. Throughout the experiment she keeps the water temperature in all fish tanks at the same temperature and ensures that all fish are of the same age.

36. Which variable is the dependent variable and on what axis would it normally be graphed?

37. In the previous scenario, why does it matter that all of the fish in the experiment are the same age?

In the previous scenario, the researcher had a treatment group exposed to an initial concentration of 20 mg/L, but by the end of the experiment the concentration for this group had increased to 25 mg/L due to water evaporating and leaving pollutant X behind.

38. What is the percent change in the concentration of pollutant X that this treatment group was exposed to during the experiment?

39. If the containers in which the fish were raised held 1000L of solution, and the concentration of pollutant X was 25 mg/L, how many kg of pollutant X were in the solution?

40. Express 0.0025 kg/L in scientific notation.