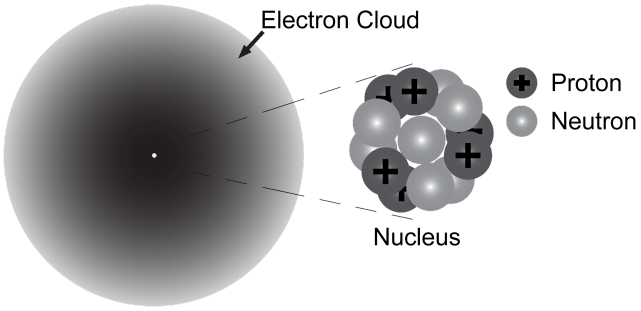
First some review of Atoms and Minerals:

Mineral Definition

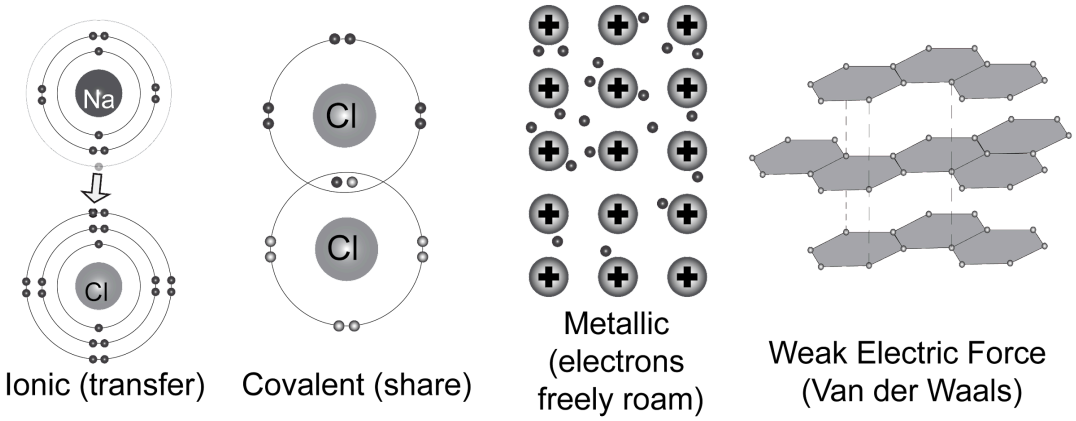
Naturally occurring, inorganic, crystalline solid with set chemical composition.

Atoms



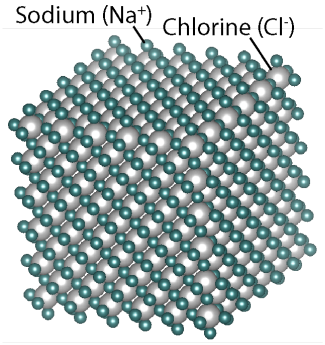
An atom has a nucleus which is made up of protons and neutrons. A cloud of electrons surrounds the nucleus. The number of protons in an atom defines what element it is.

Bonds

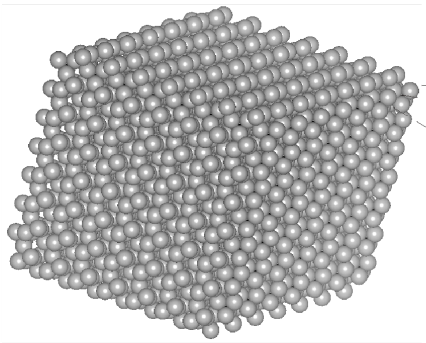


Ionic bonds involve the transfer of an electron from a cation to an anion. Two atoms which share electrons therefore giving each a complete outer shell are said to be covalently bonded. In metallic bonds, the atoms are closely spaced and electrons are allowed to roam about the network of atoms. Some atoms or groups of atoms are held together by weak electrical forces.

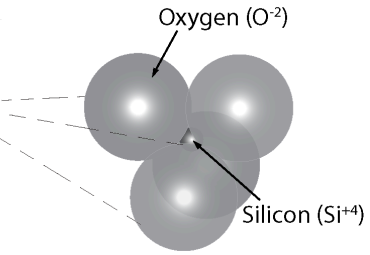
Crystal Structures



Halite



Quartz



Silicon-Oxygen
"Tetrahedron"

In minerals, atoms bond together arranging themselves in packages of cations (positive charged ions) surrounded by anions (negative charged ions). The arrangement of atoms often has a distinctive outer shape that repeats from the atomic level to the macro scale that you might see in macro-scale (a hand sample in the palm of your hand).

Now, test your knowledge:

Briefly define the following terms:

mineral -

rock -

atom -

element -

isotope -

cation –

anion -

ionic bond -

covalent bond –

metallic bond –

Van der Waal's force –

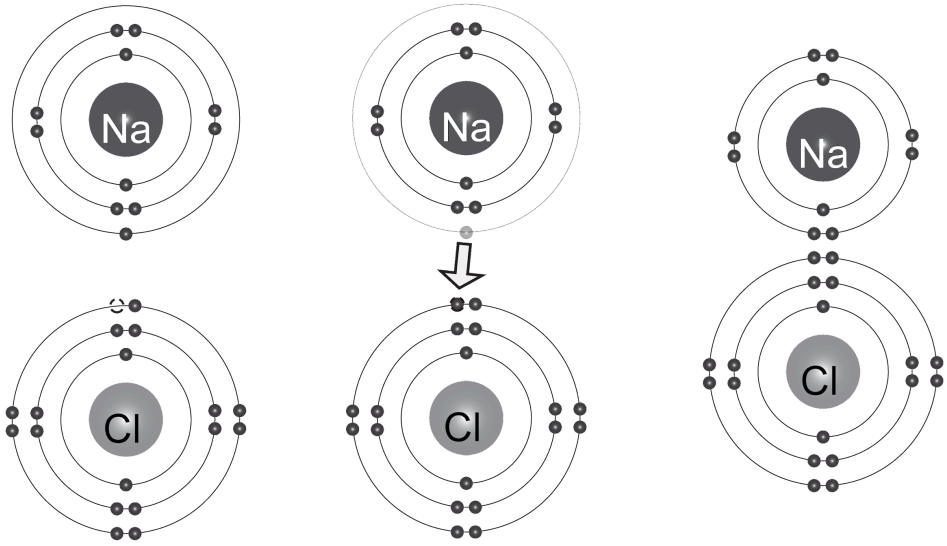
Answer the following:

1. True/False. Ice is a mineral.
    A. True
    B. False

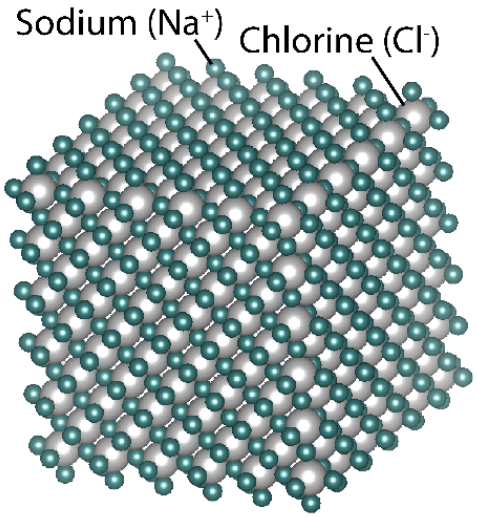
2. An atom is the smallest, electrically neutral assemblage of energy and matter, consisting of:
    A. Protons, Neutrons, and Electrons.
    B. Protons, Electrons, and Positrons.
    C. Neutrons, Ionic Bonds, and Protons.
    D. Positrons, Neutrinos, and Covalents.

3. An atom is determined to be a particular element, according to the:
    A. Number of Netrons in the nucleus.
    B. Number of Protons in the nucleus.
    C. Number of Electrons in the nucleus.
    D. Number of Electrons in the electron cloud.

4. Which of the following describes an isotope of an element?
    A. An atom of a particular element with more Neutrons than Protons
    B. An atom of a particular element with more Protons than Neutrons
    C. An atom of a particular element with more Electrons than Neutrons
    D. An atom of a particular element with more Electrons than Protons



5. In the above image, the two atoms become bonded by what type of bond?
    A. Ionic
    B. Covalent
    C. Metallic
    D. Weak Force



Halite

6. In the above diagram, which is the cation?
    A. Halite
    B. Sodium
    C. Chlorine
    D. Cube

7. In the diagram from the previous question, how many cations surround 1 individual anion?
    A. 2
    B. 4
    C. 6
    D. 8

8. If I were to grind a large crystal of halite so that it was ground to the size of common table salt, what shape do you think the small crystals would tend to be?
    A. Traingular prisms
    B. Hexagonal prisms
    C. Cubes
    D. Round Balls

Now, think deeper:

On your own:

9. Ignore for a moment that to be defined a mineral it must form “naturally”. Can you think of places where you live that ‘minerals’ are forming?

10. Have you ever grown rock candy? Describe what you think is happening in a jar in which rock candy is being grown.

Working in groups of 2 or 3 answer the following:

11. Compare your answers to question 9. If you had different ideas, do they represent different types of mineral growth?

12. Compare your answers to question 10. Note any differences in your explanation from your partner’s here: