Lesson I.

This lesson being preliminary, should be given in a general way, by explaining the plan of study given below and illustrating the meanings of the words in it by means of appropriate objects, not necessarily minerals.

PLAN FOR THE STUDY OF MINERALS.

1. *Hardness*—1, 2, 3, 4, 5, 6, 7.
2. *Color*—grayish-white, yellowish-white, reddish-brown, etc
3. *Streak*—(color of the powder) words similar to those used under *color*.
4. *Lustre*—metallic, glossy, dull, pearly, resinous, silky.
5. *Structure*—fibrous, granular, compact, laminated or plated, radiated, scaly, cleavable.
6. *Other properties*—transparent, translucent, opaque. elastic, flexible, brittle, tough, malleable, ductile, light, heavy.
7. Where you found the specimen, or where it may be found, if you know.
8. What it is used for.
9. Name of the specimen, if you think you know it.

In following this plan of work the pupil does not devote his energies to finding out the name of his specimen, as he too often does when he work by analysis tables; but his aim is to scrutinize his specimen closely and state the exact truth in an orderly way. Analysis tables too often bias the pupil's judgment in favor of names, and tempt him to guess, as every one knows who has tried to find out the names of plants, by the analysis table.

For the REVIEW.

Practical Chemistry.

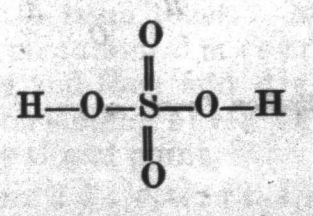
J. BRITTAIN, NORMAL SCHOOL, FREDERICTON.

LESSON VI.

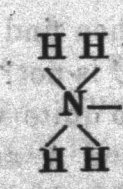
(Continued from December number),

Compare the formulas H_2O and HCl. In the second molecule, one atom of Cl has bound to itself, by the force of chemical affinity, one atom of H. In the first molecule one atom of O has bound to itself two atoms of H. The oxygen atom has shown itself capable of binding twice as many atoms of H to itself as the chlorine atom has. Hence, chemists say that the *valence* (Lat. *vales*, I am strong) or quantivalence of oxygen is twice that of chlorine. Since the attraction is mutual, the valence of hydrogen is the same as that of chlorine, one atom of Cl uniting with one atom of H. As no element has a valence below that of hydrogen, it is taken as the standard. A hydrogen atom is said to have one *bond* and hydrogen to be *univalent*. Similarly a chlorine atom has one bond, an oxygen atom two bonds. Chlorine is univalent, oxygen is *bivalent*. These bonds are represented by dashes which extend from the symbol of the element in any direction. Thus —O— or O= signifies that an oxygen atom has two bonds. A formula in which the bonds of the different atoms are thus represented is called a graphic formula. The graphic formula for water is H—O—H. In this formula the symbol for each hydrogen atom has one dash extending from it, indicating that each atom of H has one bond, while the symbol for oxygen has two dashes running out from it, indicating that an oxygen atom has two bonds. The two bonds of the oxygen atom are said to be *satisfied* by the one bond of each of the two hydrogen atoms. In a graphic formula, then, one dash represents two bonds, *satisfying* one another, one bond of each of the atoms between whose symbols it is placed.

The graphic form for sulphuric acid (H_2SO_4) may be written thus:



Here the atom of sulphur is represented with six bonds, which are satisfied by six bonds of the oxygen atoms, the two remaining bonds of the oxygen atoms being satisfied by the bonds of the two hydrogen atoms. Radicals have valence the same as elements. The graphic formula for the radical ammonium, NH_4, is:



Here the five bonds of the nitrogen atom are satisfied by the bonds of four hydrogen atoms, and one bond is left unsatisfied. Ammonium has one *free* bond, and is a *univalent* radical. The radical hydroxyl is also univalent as may be seen from its graphic formula:

—O—H

When these two radicals unite, each satisfies the free bond of the other forming NH_4OH, ammonium hydrate, the base used in two of our experiments.

Spelling "Kitten."

A dear little girl,
With her brain in a whirl,
Was asked the word "kitten" to spell.
"K-double i-t-
T-e-n," said she,
And thought she had done very well.
"Has kitten two i's?"
And the teacher's surprise
With mirth and impatience was blent.
"*My* kitty has two,"
Said Marjory Lou,
And she looked as she felt—quite content.

—*December St. Nicholas.*