

PLAINTIFF'S EXHIBIT

MON-2382

Chemistry

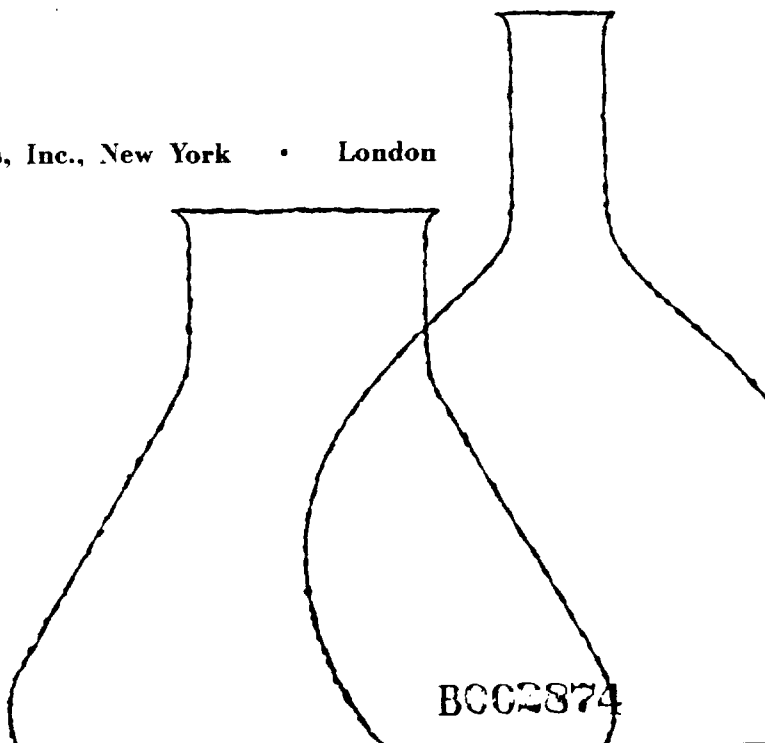
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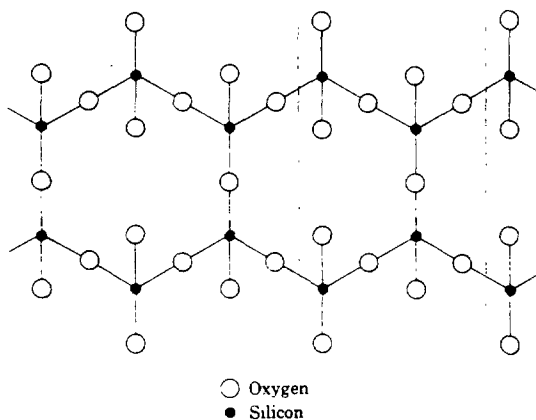
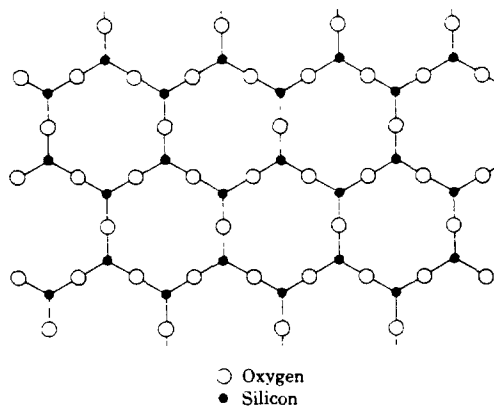


Fig. 15. The amphibole chain.

amphibole chain are of two types: one is bonded to two active oxygens, and the other is bonded to one active oxygen. The repeat unit, indicated by the dotted lines, has the formula $(\text{Si}_4\text{O}_{11})^{6-}$. Most of the commercial asbestos is an amphibole and made up of such chains. To break a long chain, it is necessary to break a chemical bond; hence individual chains are difficult to break. On the other hand, adjacent chains are held together by weak forces and it is easy to separate them. These characteristics give rise to the fibrous nature of the solid.

Sharing of three corners of the tetrahedra leads to the sheets pictured in Fig. 16. *The active oxygen above each silicon atom is not shown*, and the drawing represents only part of an infinite sheet. The general formula for this anion is

Fig. 16. $(\text{Si}_2\text{O}_5)^{2-}$ polyanions.

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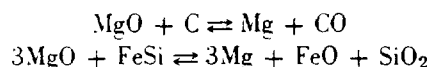
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Beryllium can be prepared by the electrolysis of a fused mixture of beryllium chloride, BeCl_2 , and sodium chloride. In metallic form, beryllium is used for making windows for X-ray tubes, since elements with low atomic number have very slight absorption for X-rays. Beryllium is also useful in the production of alloys with special properties for springs. BeO is extremely poisonous, and this limits somewhat the uses of Be in industry.

Magnesium (Mg) is found in nature as the carbonate, *magnesite*, and most abundantly in the form of silicates, including *talc*, *soapstone*, *asbestos*, and *mica*. Next to sodium, magnesium is the most abundant metal in sea water.

Magnesium metal can be produced by the electrolysis of fused magnesium chloride or by the reduction of magnesium oxide by carbon or by an alloy of iron and silicon:



It is extensively used in light-weight alloys for the construction of airplanes and rockets, but it has the disadvantage of oxidizing so readily that it must be regarded as an inflammable substance. In pure form, it burns very rapidly even in air and is one of the principal constituents of flashlight powder.

Calcium (Ca) is found widely in nature. *Limestone* consists of a mixture of calcium carbonate and siliceous compounds; *calcite* is a purer form of calcium carbonate. One of the most familiar forms of calcium carbonate is marble; it is also found in the shells of marine animals. Other sources of calcium are dolomite, $\text{MgCO}_3 \cdot \text{CaCO}_3$; gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$; anhydrite, CaSO_4 ; *fluorspar* or *fluorite*, CaF_2 ; phosphate rock, principally $\text{Ca}_3(\text{PO}_4)_2$. Bones of animals consist largely of calcium phosphate. There is considerable calcium present in sea water in the form of the doubly charged ions, Ca^{+2} . Metallic calcium can be prepared by the electrolysis of fused calcium chloride, CaCl_2 . It is used as a deoxidizer for iron and steel as well as copper; it is a constituent of some lead alloys.

Strontium (Sr) is found in a mineral called *celestite* (SrSO_4) and in *strontianite* (SrCO_3).

Barium (Ba) is found in a mineral *barite* (BaSO_4). Because of its large atomic number, barium absorbs X-rays strongly. When studies of the gastrointestinal tract are made, patients usually swallow a mixture of barium sulfate and water in order to make the organs stand out in the X-ray photograph or the fluoroscopic view. Although barium compounds are highly poisonous, the sulfate is so insoluble that the body does not absorb significant amounts. A green color is produced in fireworks by barium nitrate, $\text{Ba}(\text{NO}_3)_2$, and by barium chlorate, $\text{Ba}(\text{ClO}_3)_2$.

Compounds. The elements of this group have two electrons in the outer shell:

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