A Note Concerning the Emission of Odours when certain Sulphides are vigorously rubbed on, or with, certain metals

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IT is well-known that friction elicits characteristic odours from some minerals. (See, for example, Dana's Textbook of Mineralogy, 4th Edn., Wiley & Sons, Inc., N. York.) Thus friction causes an alliaceous odour to be emitted from arsenopyrite, a sulphurous odour from pyrite and an odour of hydrogen sulphide from certain varieties of quartz and limestone. It has also long been known at Camborne, although it has apparently never before been published, that when some varieties of sphalerite are vigorously scraped with a penknife blade just under the nose a distinct odour of hydrogen sulphide is apparent.

In order to demonstrate the presence of mercury in such mineral species as calomel and cinnabar we streak the mineral on a piece of sheet aluminium. The presence of mercury is indicated by the development of a white fungoid growth of Al_2O_3 along the streak. While examining cinnabar by means of this test — which has not hitherto been described — one of us (D.W.L.S.) detected an odour of H_2S when the mineral was vigorously rubbed on the metal. As a result of this observation a group of students undertook to examine a number of the common sulphides by rubbing them on small sheets of a variety of metals in order to obtain further information concerning the phenomenon under discussion.

The species tested included bornite, chalcocite, chalcopyrite, cinnabar, galena, marcasite, molybdenite, pyrite, pyrrhotite, sphalerite, stannite and stibnite, whilst the metals employed were aluminium, copper, iron (knife-blade), lead, magnesium, nickel, silver and tin.

All the above species caused the development of an odour of H_2S when they were vigorously rubbed on either a piece of aluminium or magnesium, but not on the other metals. The odours due to pyrite, marcasite and molybdenite were the least intense. Some varieties of sphalerite caused a similar odour when scraped vigorously with a knife-blade, but this treatment was without apparent effect on the other minerals.

Throughout the series of tests it became quite evident that only the results of non-smokers were reliable, and for all it was necessary to carry out the tests immediately below the nose.

Ignoring for a moment the anomalous reaction between iron and sphalerite, the reason why H_2S is emitted when the above minerals are rubbed on aluminium or magnesium only is doubtless associated with the facts that these two metals are considerably higher in the electrochemical series than those metals which constitute the cationic portions of the minerals tested, and that furthermore the sulphides of both aluminium and magnesium — unlike those of the other metals employed — are readily hydrolisable. It is suggested therefore that when a sulphide is rubbed on, for example, aluminium, that aluminium sulphide is first formed, and this reacts with water absorbed on the surfaces of the mineral and the metal, and probably with water-vapour in the air, causing the development of H_2S and $Al(OH)_3$. Simultaneously the liberated cation of the mineral reacts with water, oxygen or carbon dioxide, forming a hydroxide, oxide or carbonate.

The reason for the development of an odour of H_2S when some varieties of sphalerite are vigorously scratched with a knife is not yet apparent.

These results have been described, not because it is considered that they are of diagnostic value, but because of their intrinsic interest to mineralogists.

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