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Professional Growth

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cules are usually aggregates of atoms and that atoms are always aggregates of positive and negative charges of electricity, it is perfectly natural to assume that these molecular attractions are electrical and consist of the interactions of oppositely directed, unbalanced molecular charges. In other words, adhesion and cohesion take place in accordance with the fundamental principle of static electricity, a principle which states that two unlike charges attract each other with an intensity directly proportional to the product of the charges and inversely proportional to the square of the distance between them.

That the attractions of molecules are significant only through incredibly small distances is evident in all cases of mass breakage. The molecular attractions in a steel rod are tremendous in their total effect, as evidenced by the tons of force necessary to pull them apart. When, however, a steel rod is once broken, the two pieces cannot be firmly reunited even by putting them together in the most exact manner and under an enormous pressure. The molecules cannot be brought close enough by pressure to make the two pieces hold. This can only be accomplished by heating the broken ends to a plastic state and hammering the molecules into close proximity as in the case of mechanical welding.

Such properties of matter as malleability, ductility, brittleness, hardness, elasticity and rigidity are merely different exhibitions of the electrical molecular attractions we commonly call adhesion and cohesion.

(To be continued)

L. BEGEMAN

PROFESSIONAL GROWTH

(Concluded)

Chemistry

The first class provides bits of scientific information which can be interspersed in class discussions. Such items will add interest to the class work and may indicate new and modern uses for chemical substances and appliances. They are found in such publications as *Popular Science Monthly*.

The second class of articles are indispensable to good teaching. Courses in methods may have been studied in college, but with practical exper-

ience the teacher finds that "how to teach" becomes an ever growing problem. It is also true that new methods are constantly appearing, with which he should become conversant. The old idea that anyone who knew a subject could teach it, is obsolete. Modern teaching requires a skill that demands a knowledge of methods. If the present reader, as a teacher of high school science, is employing the same methods that he used a decade ago, he should hasten to disinter the professional ideals which were laid to rest somewhere along the road. The books which offer you a challenge in methods are of the type of *Downing's Teaching Science in the Schools*; the magazines include the *Journal of Chemical Education* and *School Science and Mathematics*.

High school chemistry is, of necessity, so elementary that the teacher's fund of knowledge is seldom challenged by those better informed than he. This offers a temptation for mental loafing. Such a lure must be resisted. Read the new college texts; study the articles that appear in professional chemical journals, even though they are a little beyond the bounds of your comprehension.

Various pamphlets offer supplementary material. Among these are *Science Classroom*, *Chemist-Analyst*, *Science News-Letter*, *Current Science* and *Chemistry Leaflet*.

The professionally minded teacher welcomes the opportunity to attend conventions and other scientific meetings. Here he receives the stimulus of associations and discussions with those of like interests and obtains the help offered in the addresses and papers. Occasional return to college, even though it be for only six weeks in the summer and without academic credit, is to be commended. If properly directed, this "brushing up" is worth every cent it costs. As another incentive to study, prepare papers or lectures for conventions, for local clubs, or just for the satisfaction of delving intensively into some technical topic. The writer makes no claims to diagnostic abilities, but he believes that when the thrill and enthusiasm and ambition for superior work has gone from the teacher's daily tasks, professional disintegration has started.

R. W. GETCHELL