In the field of lubrication there may be interesting developments at any time as we study the relations between molecules and their physical effects. How great a part does viscosity play? or the chemical composition of lubricants? We have been accustomed to think that there should be no free fatty acids in lubricants, as they might tend to corrode the metal. We are now informed that small amounts of free fatty acids are much more effective than large amounts of the neutral oils from which they are separated. Roughly the coefficient of friction is lower with, say, 99% mineral oil and 1% fatty acid than with 40% mineral oil and 60% neutral vegetable oil. These figures are illustrative, not exact.

As an illustration of the importance of comparatively simple things, there is the case of flotation in the mineral industry. A recent writer has pointed out that 60,000,000 tons of ore are treated annually by the application of the forces in soap bubbles.

My attention has recently been called to a case where complaint was made that a mill effluent caused foaming in the water of a stream, and that this foam, becoming frozen, interfered with the generation of power at a plant downstream.

Frequently owners choose architects and contractors and leave the employment of engineers or chemists at their option, with no provision made for the latter in the estimates. In some cases an engineer is appointed, but I cannot recall any large piece of structural work for which a consulting chemist was appointed at the outset. I believe many cases in which the engineer's advice has been overridden by the better interests of the owner if the engineer had had a fellow-scientist to support him.

PRACTICAL TRAINING FOR ENGINEERING STUDENTS

CANADIAN engineers who are concerned with educational work will be much interested in the details of the new plan for industrial training that will be adopted next June at the Harvard Engineering School, in Cambridge, Mass. The first two years of any engineering course at Harvard will be substantially the same as at any other university excepting that there will be no differentiation between mechanical, civil and electrical engineers, and the students will not be segregated—either in their classes or in their social relations—from the other undergraduates at Harvard, thereby escaping the narrowing influence of an exclusive association with other engineering students. They will be required to take certain courses in mathematics and pure science but will have the opportunity of obtaining as broad an education as students of their class in any other course. The work of the senior year will also be carried out along the usual lines.

Combined engineering study and work in industries will start in June of the sophomore year and last until October at the beginning of the senior year. During those 16 months the class will be divided into two equal sections, which will alternate from study to industrial experience at two-month intervals, with one vacation period for which the ambitious student may substitute industrial work. Those students who take the regular offering will get eight months of study (which is the actual study time at present) and six months of experience in the industries; those who so desire may have eight months in the industries. There will be a continuous supply of students to the industries and continuous instruction in the school. Courses given within this period will have to be duplicated.

The scheme outlined above will be optional, but the present indications are that it will be elected by practically all students in the school. It adapts itself well to graduates in arts or sciences from Harvard or other colleges who enter the third year of the engineering school, even if they enter in August or as late as October.

The co-operation with the industries will be under a director who will arrange with the industries for placing the students at such work as will give them the best opportunities for experience. The students will receive the same pay as other workmen doing similar work, and will be treated by the industries like other workmen except that the director of co-operation will have freedom of access to each student at any time, and will be permitted to arrange the general character of his work. The director will meet groups of the students in the evenings during their industrial period to discuss with them their problems and experience.

Each student will be given a syllabus of questions relating to the type of work which he is doing, the answering of which will require him to observe closely not only the technical processes which he himself is carrying out, but also the whole system of management of the factory, and such general technical details as he may have opportunity to observe. The syllabus will also require him to apply to his observations the engineering theory acquired during his studies.

HAMILTON CONTROLLERS RECOMMEND FILL

ALTHOUGH E. R. Gray, city engineer of Hamilton, Ont., recommends the construction of a bridge instead of a fill to carry the Toronto-Hamilton highway across the Valley Inn ravine at the western entrance to the city of Hamilton, the Board of Control of that city has unanimously recommended to the city council that the ravine be spanned by means of a fill, at a cost of $280,000, compared with $1,226,590 estimated cost of a steel bridge or $1,419,100 estimated cost of a concrete bridge.

The estimate of the cost of the fill was prepared by E. H. Cummiford, chief engineer of the Toronto-Hamilton Highway Commission, and includes the following items: Grading, $100,000; bridge, $35,000; hand rail, $10,000; share of overhead bridge, $9,000; rip-rap, $5,000; tile in cut, $12,000; right of way, $45,000; pavement, $25,000; pavement from city line to high level bridge, $25,000; extra width of pavement from Waterdown to the high level bridge, $14,000; total $280,000.

In his report on the advisability of constructing a bridge, Mr. Gray discussed the fill proposition as follows:—

"Considerable support has been given a fill proposal, because it offers a less expensive and perhaps a more expeditious solution to the entrance problem.

"I desire merely to point out that while this suggestion in a measure reduces the sharp curvature and lessens the depth of the ravine; the rise to the high level from the level of the roadway on the fill is still approximately 50 ft., and the grade is improved something less than 2%.

"In addition, subsidence, and settlement of the fill for years would prevent the construction of a permanent pavement. It will be necessary also to reconstruct the bridge over the Grand Trunk and C.P.R., and the structure at the existing subway below the Grand Trunk, the estimated cost of which should be included in any estimate presented for comparison. I am of the opinion that the city of Hamilton is worthy of a more fitting entrance even at the expense of some delay, in order to secure what ultimately will be the best solution of this problem."

The nominating committee of the American Water Works Association has unaminously named the following candidates to hold office for the ensuing year: President, Beekman C. Little, superintendent of water works, Rochester, N.Y.; vice-president, Col. Edward Bartow, director of state water survey, Urbana, Ill.; treasurer, J. Water Ackerman, superintendent of the water board, Auburn, N.Y. By direct action of some of the members of the association, additional nominations have been filed, as follows: President. Capt. M. L. Worrell, Meridian, Miss.; vice-president, W. S. Cramer, chief engineer, Water Works Co., Lexington, Ky.; treasurer, J. M. Caird, chemist and bacteriologist, Troy, N.Y. Capt. Worrell is now vice-president of the association, Mr. Caird is treasurer, Messrs. Little and Cramer are trustees whose terms expire this year, and Mr. Ackerman is a member of the finance committee.