THE ROLE OF THE CHEMISTRY TEACHER IN NATIONAL DEFENSE

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Fear has been expressed in certain quarters that a sense of frustration might develop in the minds of chemistry teachers because of their inability to take an active part in the war effort. Before Pearl Harbor, we were always speaking of our defense effort. Slowly, since December 7th, there has been a distinct change from a spirit of defense to a spirit of offense. We are hearing less and less of the necessity of purchasing defense stamps and bonds, and more and more of the privilege of purchasing war stamps and bonds to sustain our *offensive effort.* Slowly the nation is beginning to gain a better conception of the magnitude of the war effort and to realize that we have a home front as well as the battle front. In this home front the chemistry teacher can perform a very important role.

We are beginning to realize that this is "total war". In 1937 it seemed incredible to all of us that it was a crime in Germany to discard an empty toothpaste tube. But now we find that we cannot purchase a tube of toothpaste unless we turn in an empty tube. This typifies the meaning of total war. Successful prosecution of the war requires correlation of effort between the home front and the battle front. One of the important functions of the home front is the battle of production—munitions, tanks, planes, ships, fuel, and hundreds of other items needed in quantities never dreamed of before. We have become the principal arsenal of all the United Nations. The enemy can be expected to do everything in its power to disorganize our home front. This is not the place to discuss the possibility or probability of assaults by air with incendiaries, high explosive bombs and gas in the interior of this nation. The attack on Pearl Harbor was not thought possible, but it did occur. Before January 1st, no one would have thought it possible for Germany to sink one or two ships a day on our side of the Atlantic. But it has been done. Our army and navy authorities point out that a bombing of industrial centers in Illinois can be expected. The great circle route from Norway to Chicago is about the same distance as that from Germany to New York. However, the chances of detection of enemy bombers over this route would be very small because most of the route lies over uninhabited forest region in Canada. The objective of such a bombing, of course, would be to demoralize the civilian population and to hamper production. Especially in densely populated manufacturing areas, our government wishes that all citizens should have some instruction in the nature of high explosive and incendiary bombs, that they might know what to expect and what to do in case of bomb and gas attacks. A bombing with ten medium size bombers might start as many as 1500 fires in the congested area of a large city. The only way to combat this kind of an attack is with a trained citizenry.

The training of citizens in proper blackout methods and the proper procedure to follow in case of gas, fire and air attack involves problems in the selection and training of personnel in which the chemist should play an important role. Chemistry teachers should prepare themselves *now* to take an active part in training gas, fire, and air defense personnel, decontamination and gas detection squads. All teachers of chemistry should have the following handbooks put out by the U. S. Office of Civilian Defense: *Training Courses for Civilian Protection, First Aid and Treatment of Chemical Casualties, Gas Defense, Handbook for Decontamination Squads.* Another excellent handbook procurable from The British Library of Information in New York City, R. C. A. Bldg., is *Basic Training in Air Raid Precautions.*

There is a second important way in which the teacher of chemistry can help

increase the effectiveness of the home front. Our war effort is on such a tremendous scale that there is an actual shortage of many essential materials. For example, our average annual production of aluminum for the five years preceding 1939 was 256,000,000 pounds. Current production is at the rate of 700,000,000 pounds annually, and the supply is not equal to the demand. Hence, the absolute necessity to salvage every piece of scrap aluminum in the country to get it back into use. Aluminum is but one example of many materials of which there is an actual shortage. Recently the WPB published a report on the war status of many materials. In Group I are materials where the present supply is *not equal to the demand.* Citizens will have to do without consumer goods made of these materials or use available substitutes.

GROUP I. — "CRITICALLY ESSENTIAL FOR PROSECUTION OF WAR"

Metals

Alloy steels
  Iron alloys
  Wrought iron
Aluminum
Aluminum scrap
Cadmium
Calcium-silicon
Chromium
Cobalt
Copper
Copper scrap
Iridium
Lead
Magnesium
Nickel
Tin
Tin plate and tern plate
Tungsten
Tungsten high speed tools
Vanadium

Chemicals

Alcohol, methyl
Chlorinated hydrocarbon refrigerents
Chlorinated hydrocarbon solvents
Chlorine
Diphenylamine
Formaldehyde
  Paraformaldehyde
  Hexamethelenetetramine
  Synthetic resins therefrom
Phenols
Polyvinyl chloride
Sodium nitrate pure
Toluene

Miscellaneous

Agar
Asbestos—long fibre
Burlap and burlap products
Cashew nut shell oil
Corundum
Cotton linters
Graphite—Madagascar
Hempseed
Jewel bearings
Kapok
Manilla fiber and cordage
Pig and hog bristles
Rubber, crude and latex
  Chlorinated
  Synthetic
Shearlings
Silk
Silk waste
Silk noils
  Garnetted
Reclaimed silk fibre
Sperm oil
Tin cans
Titanium pigments
Tung oil

The chemistry teacher, through his teaching and professional contacts can help acquaint the general public with this shortage of many critically needed materials and emphasize that it is the patriotic duty of each one to do without consumer goods made from these materials, that they may be available for those of our nation who are at the front.

Again, the chemistry teacher can help to get his community "scrap and waste material minded." In every community there should be voluntary organizations to continually stress the necessity of saving scrap and waste materials to get them back into use. The steel industry which is at an all time "production high" is actually being handicapped because of the difficulty of getting sufficient steel scrap. Chemistry teachers do not need to be reminded that the charge of an open hearth furnace consists of steel scrap and iron as well as molten pig iron. Almost every freight train which we now see contains gondola cars filled with iron scrap bound for the steel mills. But there are not enough of them. A short journey through the country will reveal many carloads of scrap iron and steel, which not only detract from the beauty of the countryside, but which are rusting away. There should be an effective voluntary organization in each community to push the cause of—"Save your scrap to beat the Jap."

Because of their knowledge of the properties and uses of these vitally needed materials, teachers of chemistry are in a position to emphasize the necessity for saving all scrap and waste materials that can be reused. This includes:

1. All metal scrap, from an old baby carriage to a tooth paste tube.

2. All waste paper—newspapers, magazines and paper cartons.

3. All scrap rubber from an old casing to discarded garden hose.

4. All fats and edible greases from the kitchen.

We have become a prodigal nation. Of our annual production of paper in excess of 10,000,000 tons, only 22% went to uses where it was permanently taken out of use and only 28% was recovered. The remainder, or 50% was destroyed mostly by burning. Our grandmothers carefully saved all fat renderings from the kitchen for re-use, but now most housewives discard them or burn them with the garbage. If a million housewives in the State of Illinois alone would save a half pound of fat a week, it would be enough to produce 57,000 pounds of glycerol, not an inappreciable sum. Large hotels and restaurants have always saved their fats. We should do the same to help the family purse and to get added glycerine and fats for the war effort. The OCD has tried to set up machinery reaching into every community for this purpose, but whether or not the plant functions depends upon those who have the grease and fats to conserve.

I am sure that the large number of people who are not turning in scrap and waste material do not wish to be unpatriotic. Their apparent apathy is due to lack of knowledge. The OCD has an enormous task in setting up voluntary organizations in all communities to carry the message of civilian defense and the saving of scrap. The chemistry teacher should be functioning in this job.

The question may be asked, "How is the chemist to find his place?" In the first place, he should inform himself of the nature of the many tasks confronting the OCD; then he should volunteer his services in his own community. There is no reason why he should not assume a position of leadership in this work. Many chemistry teachers are doing that very thing. The writer for example, recently gave a demonstration lecture to 600 fire wardens on magnesium fire bombs with a discussion of the proper method of fighting them.

The chemistry teacher has another very important function to perform in this conflict. This is a war of machines, and men and women trained to operate those machines form largely a specialized personnel. Under the impact of war, college and university enrollments have decreased. No one knows how long this war will continue nor at what level college and university enrollments will again stabilize. In England and Canada enrollments have stabilized at about 50% of pre-war enrollments. No one knows if this will be true in this country. But our government and our military leaders appreciate the necessity of continuing the training of young men and women along lines necessary for the war effort. The newly announced V-1 program of the U. S. Navy provides for training up to 80,000 qualified young men with at least two years of college work. The newly announced plan for the U. S. Army Enlisted Reserve envisions a pool of college students large enough to supply 50,000 young people annually for the next four years for the officer training schools of the U. S. Army Air Corps. Those accepted for the army reserve will be allowed to finish their college courses. Then, too, women will have to be trained to fill many technical positions usually filled by men. In this vast training program, the chemistry teacher will play a very important part. He should encourage young men with aptitudes in mathematics, science, medicine, and engineering to get the viewpoint that it is patriotic to get as much training as possible. We can prepare for the war of two or three years hence *now*. While college enrollments will probably continue to decrease for some time, it is very probable that additional burdens will fall on mathematics and science departments. This may call for greater attention to duty and more working hours. In many cases this enhanced program will call for more effective use of physical plants. It certainly will call for a critical evaluation of course content in order to save time. All these chemistry teachers are ready to do to assist in training the increased quota of physicians, chemists, physicists, engineers, laboratory technicians, supervisors, and inspectors needed for war industries and the armed services. To paraphrase the words of a well-known news commentator at the close of each of his broadcasts—

"Chemists are proud to assume the responsibility of helping this nation to make an effective home front to make possible the successful conclusion of the war by those on the battle fronts."