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SELECTED TRANSLATIONS ON CHEMICAL INDUSTRY IN COMMUNIST CHINA

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SELECTED TRANSLATIONS ON CHEMICAL INDUSTRY IN COMMUNIST CHINA

[Following is a translation of selected articles from various issues of the Chinese-language periodical Hua-hsueh Kung-yeh (Chemical Industry), Peiping. Date of issue, page, and author, if any, are given under individual headings.]

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## I. AUTOMATIC ANALYSIS ADOPTED BY THE TAI-YUAN CHEMICAL PLANT

No 7, 6 April 1960  
Page 12

Wang Yu-kuei

Automatic analysis has been adopted by the Tai-yuan Chemical Plant. Since the recent adoption of highly automatic processes and remote control at the various stations of the Tai-yuan Chemical Plant, analytical process has fallen far behind the production rate. The Party's Secretary called on all the analytical workers to break the deadlock and use automatic push-button processes. With the assistance of other workers, young analytical worker Chou Hsueh-liang of the electrolysis plant was finally able to successfully invent a chlorine gas automatic analyser. After this invention, analytical workers in the Central Research Laboratory further successfully developed a multi-purpose automatic gas analyser, a multi-purpose automatic liquid viscosity analyser, a automatic polarographic analyser, and automatic titration meter based on this principle. The multi-purpose automatic gas analyser provides for automatic timing analysis, automatic control adjustment to maintain constant inlet gas pressure, automatic signaling, automatic adjustment for constant temperature control, etc. It automatically analyses many different gases including chlorine, hydrogen, oxygen, nitrogen, sulfur dioxide, sulfur trioxide, carbon monoxide, ammonia, etc. The multi-purpose automatic liquid viscosity analyser which provides for automatic viscosity indicator, automatic signaling, automatic temperature compensation feature, etc., is capable of analysing sulfuric acid, caustic soda, hydrochloric acid, chlorosulfonic acid and other inorganic liquids as well as benzene, benzene chloride, alcohol, chloral, and other organic liquids. The automatic polarographic analyser which is based on the foundation of the existing polarographic analysis, includes automatic hydrogen control, automatic mixing device, polarographic instrument automatic control, automatic constant temperature control, automatic signaling, etc. It has the ability to analyse almost all kinds of metals in micro quantity and organic compounds which undergo chlorination and reduction reactions. The automatic titration meter uses the photoelectric effect of the selenium cell to automatically control the end point of titration; moreover, any titration end point which gives color change may use this meter.

The successful invention of various automatic analysers has completely changed the slow progress of analysis. For instance, the usual process of determining the acidity of sulfuric acid required as many as 18 steps including sampling, weighing, dilution, titration, calculation, etc., a single analytical process might require as many as 5 hours. Even for continuous operation, 2 hours were definitely needed. But now, all you have to do is to turn on the switch and acidity will immediately be indicated by the automatic signal. The percentage of hydrogen inside chlorine gas in an electrolysis bath

should be checked every two hours according to the regulation. Each round of checking involves 14 analytical steps and requires 16 minutes per bath. Two checkers can only check 60 baths per shift and all the 280 baths in the section will require a day and a half for each round of checking. The newly invented automatic time analyser gives immediate analysis upon request and is fast and accurate.

The successful inventions of automatic analysers have saved us many labor hours and most of the analytical workers may be reassigned for other duties. Furthermore, many plants may cancel specialized analysis projects because intermediate analysis and control work can be shared by the operators who can do both types of work at the same time.

## II. TECHNICAL REVOLUTION MOVEMENT IS STRONG IN THE SIX MINES OF THE CHEMICAL SYSTEM

No 7, 6 April 1960  
Page 18

Tai Ch'ing-sung

A movement aimed at full and semi-mechanization, full and semi-automation, proper mining practice, and the substitution of other materials for lumber used in the mines has been under way since last March at the Ch'in-ping, Kai-teh, and Ching-hsiang phosphor mines and at the Hsiang-shan, Yin-teh, and Hsin-pin pyrite mines.

At the present time, all the workers of the six mines are closely working on our productive construction tasks and are swiftly marching all-out toward this technical revolution under the forever revolutionary red flag flying high in the sky.

Workers of the Chin-ping Mine have already enthusiastically changed to four shifts crosswise work schedule and are determined to make 80-95% of the operation mechanized this year. A part of the selective operation will also be automatically operated, the consumption of explosive and lumber will be cut down by 20-30%, and the rate of production of all workers in the mine will be 127% higher than the figure of last year.

After having completed the expansion work on 23 March of this year, the Hsiang-shan Pyrite Mine has been changed to a four-shift operation. Mechanization has been started on selection, collection, and shipping operations. The machinery includes rock loading machine, electrical rake for loading, and windlass. The production of mineral rock has been increased from the original 80-90 tons per mining operational area to 200-272 tons per mining operational area, which means an increase of 250-302% in efficiency. Liberated from heavy physical labor work, mining comrades in the Hsiang-shan Mine have expressed their gratitude to the Party with most happy feelings.

The stripping operation in the open mines of the Yin-teh Pyrite Mines is a tough job. However, owing to the enthusiasm, vigor, and determination of the workers, they have won an all-out victory

during the months of January and February of this year. Except for promoting the high stripping rate of 60,000 cubic meters per day achieved by the 10,000 miners in last year's production, they have further created new record of explosive stripping which is twice more efficient than the previous rate. In addition, workers have been trying to use native belt machine, gravitational transportation using railroad tracks, and railroad cars, all of which help to eliminate the use of shoulders for carrying loads. Machines have improved the efficiency by 13 times and a total of 4,000 manpower has been saved.

More than 10,000 workers who are constructing the Kai-yang Phosphor Mine railroad project high on the Yunnan and Kweichow Plateau are working very hard day and night trying to complete in advance this more than 30 kilometer long railroad in this rugged mountain area by the end of this year. The mine and the railroad teams are in full operation concentrating their strength on the construction of 12 tunnels, and 37 bridges and sluices of various sizes. Workers insist on continuously carrying out our revolutionary spirit. They have decided that they will try to equip themselves in case equipment is not available and install the equipment immediately after receiving it. They want to gain time by improving their efficiency and to obtain labor strength by applying technical revolution. After having fought for 35 days, mechanization has been achieved.

The Hsin-pin Pyrite Mine and the Ching-hsiang Phosphor Mine are also in the race. The latter is now concentrating strength working on the canal and the Hsiang River pier projects. Due to their efforts to mechanize the mines, the accomplishments of both mines in the first quarter operation have shown a record of continuous advancement.

### III. TECHNOLOGICAL REFORM ACHIEVEMENTS SHOWN IN VARIOUS PLANTS OF THE TIENSIN DYES AND CHEMICALS COMPANY

No 7, 6 April 1960  
Page 29

Ma Feng-chang  
Chiang Han-chang

Stimulated by the spirit of the Tientsin City Industrial Conference, a powerful new tide of technical reform and technical revolution, aimed at the preservation of high production rate, better quality products, less consumption of raw materials, and collection and re-use of these materials, has been developed at the various plants of the Tientsin Dyes and Chemicals Company, and the result so far has been tremendous. According to incomplete statistics of 30 improved products, technical reform has improved the efficiency from 10 to 100%. More than 5,000 tons of basic industrial raw materials such as acid, alkalies, salts, 4,000 tons of other raw materials and 5,000 tons of coal have been saved.

The total value of production of this company will be 50% higher than last year's figure. However, based on the raw materials the company obtained, it can only have 50% of its plans fulfilled.

In order to solve this problem while carrying out the "Four Modernization" plan, the company decided to include saving-basic-raw-materials as one of the main objects in the technical revolution. Workers in the various plants are encouraged and assisted in making plans and in carrying out various drastic experiments on technological reform, collection and reuse of raw materials and the substitution of raw materials. Four technical discussions were organized with participants including principle technical workers of the various plants and laboratories, and the professors of Tientsin University. The plants also use the "triple integration" method to conduct analysis and discussion on the production of major products. At the third plant, workers have drastically increased the amount of some material used in the production of intermediate G salt and the results are a 1/8 increase in production and much less sulfuric acid consumption. With the assistance of concerned units, the seventh plant has changed the material ratio for the production of scarlet base with a resultant savings of 29 tons of o-toluidine, 380 plus tons of sulfuric acid, large amounts of ice and salt, as well as a 10% increase in efficiency. All the technical members of the Advanced Collective Central Laboratory of the 5th plant who participated in the National Heroes' Conference were deeply engaged in various experiments with the workers. After ten days of tough work, they emerged with improved technical flow sheets and operational methods for 6 products including toluidine, and benzidine. These can save 85 manpower (1/6 of the total number of workers of the plant), 1,000 tons of coal, 800 cubic meters of lumber, 600 tons of salt, 400 tons of Yuan-min powder, and 3,000 tons of ice annually.

Right now, the workers of the company are improving even more in the process of saving more raw materials and intermediates.

#### IV. EXPERIENCES IN CONTINUOUS NEUTRALIZATION IN CHLOROBENZENE PRODUCTION

No 7, 6 April 1960  
Page 35

Chlorine Plant of  
the Tientsin Chemical  
Factory

When benzene is chlorinated in a dark reaction using iron catalyst, chlorobenzene and its by-product hydrochloric acid are produced. In industrial operation, the post-chlorination solution contains chlorobenzene, polychlorobenzene, unreacted benzene, hydrogen chloride, and ferric chloride. After a distillation process, chlorobenzene is obtained and benzene is recovered. In order to avoid equipment corrosion by the chlorination solution in the distillation process, the acidic chlorination solution must be neutralized and washed to remove its hydrogen chloride and ferric chloride. Prior to 1958, these procedures used in the production of chlorobenzene by this

plant were all intermittent. The improved continuous operation has increased the production capability 4 to 5 times. The original intermittent neutralization process which is still in use involves heavy labor consumption, a severe corrosion problem, a large amount of benzene required, and, furthermore, cannot be effected in coordination with the continuous chlorination process.

In the technical revolution movement, we have absorbed the advanced experiences of the Soviet Union and courageously adopted the continuous neutralization production experiment which has already been put into production. The new process has more than doubled our production capability, thoroughly put our chlorobenzene production into continuous operation, simplified the operational procedure, cut down labor usage, solved the equipment corrosion problem, improved working conditions, and, furthermore, has cut down the requirement of alkali solution by a factor of 20 and used 35 kilograms less benzene on the average than in 1959, which brings the unit benzene requirement down to 785 kilograms.

The continuous washing process is as follows: the acidic post chlorination solution is mixed with water by certain proportion before entering the washing device which is a cylindrical container filled with 25 x 25 x 3 magnetic rings. After the removal of most of the acid and ferric salts, the mixture of water and acidic chlorination solution goes into a separator which separates water and acid and sends them into the drain. The washed solution which still has slight acidity will be neutralized with alkali. The neutralization device is actually a centrifugal pump which mixes and neutralizes, by the swift rotation of its pump blades, the washed chlorination solution with a dilute alkali solution which enters simultaneously with the former. The excess alkali solution and the neutralized chlorination solution are settled in the separator until they are separated. The neutralized solution is then sent into the distillation device for a distillation process; and the separated alkali solution is sent back to the container for further use until its concentration reaches below 40 grams per liter and is then discarded.

The acidic chlorination solution used in this plant contains 0.2-0.3 gram per liter of HCl. The volumetric ratio between water and acidic solution during the washing of the acidic chlorination solution should be about 6-7 to 1. The washed solution has very slight acidity, the washing process washes away more than 90% of the acidity and more than 95% of the iron which is generally kept below 0.0001%.

The volumetric ratio of washed chlorination solution and dilute alkali solution (40-100 grams per liter) should be controlled at 225:1 during the neutralization process. The alkali solution for reuse should have a concentration of not lower than 40 grams per liter.

The mixture of acidic chlorination solution and water presents a serious corrosion problem to the equipment. To tackle this problem, all the washing equipment, pipes and fittings used are corrosion

resistant. For instance, acid-resistant bricks are used for the set-up, the tubes are glass, the fittings are painted with phenol formaldehyde resin, etc. The arrangement has basically solved the corrosion problem. The blades of the cast iron centrifugal pump last about 41 days.

It is described in the book "Industrial Synthesis of Chlorobenzene" by B. E. Pei-erh-ke-man that one of the Russian plants which uses water washing in the continuous neutralization process has discovered that water washing increases the amount of benzene required in the production of chlorobenzene by 30-35 kilograms. Therefore, the book recommends that water washing should not be used. Our experiences prove that if alkali is directly used to neutralize the ferric chloride in the chlorination solution, not only too much alkaline solution is wasted, but also produces a large amount of ferric hydroxide colloidal precipitate which creates serious clogging phenomena in the pipes. Therefore, it is proper to dilute the acid and wash away most of the iron before neutralization.

The increase in the amount of benzene required depends on the separation after the water washing process. Furthermore, the success of separation depends on the concentration of the dilute acid. If the specific gravity of the dilute acid is close to or less than the specific gravity of the chlorobenzene, the separation will be very difficult and a large amount of chlorination solution will be lost in the washing water. This is why the amount of benzene used will be higher. Based on this theory, we control the amount of water used in the washing process and the acid-water ratio above 1.01/15°C. Such control makes the separation very easy and the leaving dilute acid will contain no chlorination solution.

Looking at the actual records on the amount of benzene required, a steady decrease can be seen because the adoption of continuous neutralization has solved the problem of equipment corrosion which cuts down leakage loss considerably. The annual average of unit benzene used in 1959 was 820 kilograms. The figures in the first three months of 1960 are 803.3 kg., 788.8 kg., and 784.9 kg., respectively.

Therefore, it can be easily seen that washing process in the continuous neutralization operation will cut down the amount of benzene used if the amount of water used for washing can be properly controlled, the concentration of the dilute acid can be increased, and enough time can be given for separation.

We have realized that temperature also has an effect on neutralization. The temperature should be maintained at 30-40°C, or a little bit higher may be even more satisfactory. Low temperature hinders the process of neutralization.

## V. STRONGLY INCREASE PRODUCTION AND ECONOMY OF CHEMICAL RAW MATERIALS

No 8, 21 April 1960  
Pages 3-5

Unsigned article

The 1960 Second National Chemical Industrial Production Supply Conference was successfully completed on the 11th of April. The principle discussion was concentrated on the production and distribution of various chemical products for the second half of this year.

The present major contradiction in the production and distribution of chemical products is that the supply situation is not completely satisfied. This is especially true in the supply and demand of chemical raw materials.

What are the factors causing such a supply-demand contradiction? Is it because the rate of progress of chemical production is too slow? The answer is no. The production of chemical products has had good progress ever since the founding of the republic. The progress was especially fast during the great forward leap period. Compared with the actual production of 1959, the planned production of principal chemicals in 1960 are generally 40% to 100% higher than the previous year record. However, due to the original poor foundations of our chemical industry, especially the chemical raw material production plus the increasing demand of chemical products by the rapid elevation of people's living standards and the continuous great forward leap of our national economy, the production of chemicals will not be able to completely satisfy the tremendous demands from all corners in a very short period although production has been under high speed development.

Is it bad because of the existence of such a contradiction between the demand and supply in our chemical industry? The answer is again no. Contradiction is the motive power for the development of things. The contradiction existing between demand and supply pushes us to higher production rate, more economy, and encourages us to greatly develop the chemical technical revolution centered on a production-increasing and economy movement. As long as we continue our technical revolution and carry out such a movement, contradictions can be solved one after another.

The chemical industrial technical revolution presently going on here must include great economy of chemical raw materials as an important subject. It is only based on such a measure that the production of finished products such as rubber products, medicines, dyestuffs, plastics, and paints can be developed; and it is only through such emphasis that the contradictions between the supply of chemical products and the demand of various national economical branches can be successively solved.

What are the key points in the pursuit of a sharp increase of chemical raw material production? Generally speaking, basic organic materials and chemical raw materials are the keys to the development

of the chemical industry. A great portion of acids and alkalies, which are in the category of basic chemical raw materials, is supplied to the various branches of our national economy. In order to promote production and ensure supply, all chemical systems should continue to develop higher production of acids and alkalies. Moreover, the various branches which need acids and alkalies should try to produce some to satisfy their own requirement. Basic organic materials are mainly used within our chemical industries, and their finished products are then supplied to various branches of our national economy. The production of basic organic materials will gradually occupy a more important position in the development of the chemical industry.

The weakest links in the family of most needed chemical raw materials are, at the present time, synthetic rubber, borax, acids, alkalies (especially soda ash), coke products, chlorine products, basic organic products (especially carbide, methyl ethyl carbinol, acetone, etc.) and chemical mineral rock (mainly the transportation problem).

The fundamental way to strengthen those weak links and to double the production is to further thoroughly carry out the "both leg walking" method. It means that we will extensively develop small native groups and small modern groups while constructing large chemical bases and organize industries to develop our productive potential.

The method mentioned in the above paragraph is the correct way for rapid development of our industries. In the chemical industry, small native (modern) groups have been and will be further expanded to show their unlimited power. All the areas and all the units which require chemical raw materials should largely organize their own small native (modern) groups to struggle for complete or at least partial satisfaction of such a requirement. The development of small native (modern) groups has three phases. One is the phase of extensive construction, the second one is the point of stop, and another one is to develop potential. Let's take the contact method sulfuric acid as an example. If the average daily production of sulfuric acid by each small group, organized and put into operation last year, can be estimated as 3 tons, and add the productive power newly added this year, the total tonnage of sulfuric acid produced by these small groups throughout the nation will reach 20-25% of the planned total national sulfuric acid production. The small modern synthetic rubber groups should also be all out to maintain and reach the original targets and efforts should be made to try to surpass them. This achievement will not only have definite effects on minimizing this year's difference between rubber supply and demand, but also set up a sound foundation for next year's development. Small soda ash groups have already been established, but the production is still abnormal. The immediate action should be taken to try to correct such phenomena and restore normal production which will be followed by the establishment of more new groups. The establishment of small synthetic ammonia groups and their production situation should wait for the results of an on-the-spot

conference to summarize all the experiences for further expansion. The establishment of small methyl ethyl carbinol and acetone groups should be carried out whenever raw materials are available. Small coke, sulfonated coal and similar groups should be largely organized wherever demand and favorable conditions exist. While developing these small native (modern) groups, efforts should be made to tie in with local resources development. The extensive efforts on the recovery of coke, forest chemistry, utilization of natural gas, etc., will provide favorable creative conditions for the further development of the organic chemical industry. In addition, small mines (especially sulfur and phosphor mines) should be developed and connected with the production of contact method sulfuric acid and calcium-magnesium-phosphorous fertilizer so that the problem of mineral supply can be solved.

Small native (modern) group production development principle must also be used on material distribution. The area or organization which has better technical reform should keep the increased raw material production for its own use so that outside supply can be decreased. Such an arrangement will further stimulate local productivity and create a tide of extensive small native (modern) group and chemical raw material development.

To fully dig out productive potential is an urgent matter for any industry. This is especially true for the chemical industrial bases and structural industries. They should pay more attention to developing their own power and produce more raw materials supporting the whole nation. Looking at the angle of the technical revolution movement, the potential in this respect is tremendous.

While concentrating on production increase, all the consuming units should try all means to save more chemical raw materials. The total direction for this measure is to thoroughly carry out the "four utilization" plan which means economical utilization, complex and synthetic utilization, utilization through recovery, and utilization through discovery. A further step is to not to use it. This policy is the total experience on economy which we have learned through many years of practice in chemical industry management. It is also one of the important topics in our current technical revolution movement. As long as this policy can be carried out faithfully, the materials saved can be used for more products. We may reach the stage while "using 70% raw material, producing 100% products." This point is especially important for finishing industries.

The main point of economical use is to lower the consumption quantity of raw materials. Right now, the difference on predetermined consumption between advanced plants and retarded plants on some items is very big and the difference also exists in the same industry at different time periods. For instance, the annual average benzene consumption per ton of phenol produced in 1959 at the Ching-hsi Chemical Plant was 18.2% higher than the estimated figure and the consumption during last January was 3.4% higher than the 1959 average.

Another example shows that the pyrite ore consumption per ton of sulfuric acid produced at the Tai-yuan Chemical Plant last January was 24% higher than the consumption at the Yung-li-ling Plant. If the retarded plants can catch up with the advanced plants, more raw materials can be saved.

Complex and synthetic utilization is one of the basic policies in national industrial development and total resource utilization plans. If we base our actions on the objective rules of the conservation of matter, and composition and decomposition to develop our initiative, vigorous and courageous communistic manner, we will be capable of converting useless to useful, refusal to precious matter, and all the chemical plants will become "three non-waste" plants. Liaoning Province has started the complex utilization of iron residue, from which they hope to extract more than 10,000 tons of caustic soda in 1960. The Kirin Company is busily engaged in the treatment of drain water hoping to find some useful material and change waste to useful material. The Northern China Pharmaceutical Plant has adopted the complex utilization of 29 different raw materials. This has solved the problem of insufficient raw material supply.

There are many things that can be said about utilization through recovery, especially in the fields of medicine and organic chemical production. In the production of sulfanilamidopyrimidine, the Shanghai Pharmaceutical Industrial Co. has successfully recovered methyl alcohol and cut down consumption of caustic soda which saves 800 tons of methyl alcohol and 400 tons of caustic soda annually. Additionally, 1,000 tons of benzene is saved annually when ion exchange resin is used in the pure production of antipyrine.

The use of new raw materials, and complete and partial substitution of insufficient raw materials with cheaper and easily obtainable raw materials is another important step in overcoming the contradiction between demand and supply and in promoting production.

The present situation is excellent. Triumphant news has been continuously heard from our technical revolution movement; and they are now marching forward to battle after battle and victory after victory. We should grasp this golden opportunity to extensively, thoroughly, and tightly promote higher production and lower consumption of chemical raw materials, and to further speed up the development of the chemical industry.

VI. SECOND 1960 NATIONAL CONFERENCE ON CHEMICAL INDUSTRY  
PRODUCTION AND SUPPLY OPENED IN PEIPING

No 8, 21 April 1960  
Pages 6-7

Unsigned Article

Staff reporter -- Under the unique leadership of the National Economic Commissioners, the Ministry of Chemical Industries has successfully conducted the Second 1960 National Conference on Chemical Industry Production and Supply which was conducted from March 21st to April 11th of this year. The principal topics of discussion of the conference were the arrangement of production and the distribution of chemical products for the second half of this year, through production arrangement to organize distribution and through distribution to discover the weak links in production so that proper measures can be taken to increase production and organize supply. This is a very important preparatory work for production and has tremendous effect on the high speed development of chemical production. The participants of this conference include more than 600 representatives from the chemical industry bureaus of provinces, cities, autonomous districts and industries directly managed by the Ministry. A special report was given to the conference by Deputy Minister of Chemical Industry Wu Liang-ping.

The special feature of this conference is the strengthening of the Party's leadership and the political command. According to the directions issued by the National Economic Committee and the Party Branch of the Ministry of Chemical Industries, the conference set up a temporary party committee. In each large coordination area, a Party Branch Headquarters is established and a party division in each province or city. Therefore, the conference was filled with political atmosphere and the noble communistic manner which advocates "to keep troubles for yourself, and convenience for others," "ask less and give more," "mutual cooperation and coordination," "service to your door," etc. This is the fundamental guarantee for the conference's success.

Another feature of the conference is concentration on discussion of technical reform and revolution. Production arrangement and proper distribution of chemical products are both based on this topic. Through the use of small group discussions, many technical reform experiences were exchanged. Many specialized small groups were formed and discussions were carried out on how to dig out more potential for the fulfilling and overfulfilling of production quotas. A total of 211 suggestions and experiences were offered by the posters put out by various units on the subjects of raw material economy, increased production, raw material substitution, complex and synthetic utilization, technological reform, new products, etc. Fifteen of these are more important.

In this conference, the absolute majority of the plants eyed at the more active measures when production quotas were determined. They put emphasis on the technical revolution of the people, the control of effective measures, proper stop stage, progress of basic construction, fulfillment and overfulfillment of production quotas set up by the Ministry. The production of sulfuric acid, electrolytic caustic soda, carbide, chlorine liquid, glacial acetic acid, acetone, methyl ethyl carbinol, and many other chemicals in Shanghai all surpassed the Ministry quotas. The production of chemicals in Liaoning Province has also achieved different degrees of progress. In addition, the increase of organic raw material, sulfuric acid and soda ash production at the Kirin Chemical Company, the Nanking Chemical Company, and the Darin Chemical Plant has overfilled the quotas.

On top of the potential exploitation through technical reform and revolution, this conference has adopted the two-book system for the annual distribution of sulfuric acid, soda ash, and caustic soda. The purpose of this is to further satisfy the leaping demand of various branches of national economy. Furthermore, many items concerning technical reform and revolution (with emphasis on chemical raw material economy) were brought out by the units. The use of iron residue for the production of caustic soda in Liaoning Province increases caustic soda production by 10,000 tons annually. It can also be used to produce phosphorus oxide, sulfur, and other products. The Shanghai Chemical Industry Bureau has saved 11,580 tons of raw materials annually by substituting other materials for hard to get materials, or by cutting down usage or eliminating completely.

Distribution methods were also revolutionized in this conference. One of the examples is the distribution of sulfuric acid which has utilized the local balance and deficiency compensation method. This method is based on the unified planning and echelon management principle which is based on the productive index and distribution index in connection with local conditions. Therefore, a plan can be organized which details the quantities of raw materials produced locally to support their demand, and the excess and deficiency have to be adjusted. The adoption of this method avoids the long distance transporting of sulfuric acid, saves labor and containers, and more important, ensures supply to encourage production. The conference believes that such an arrangement should be applied to other products as well.

## VII. BLOSSOMS OF SYNTHETIC UTILIZATION IN SMALL NATIVE CHEMICAL GROUPS

No 8, 21 April 1960  
Pages 11-12 (excerpts)

Ch'iu Yao-kun

### A. Synthetic Utilization Can Fully Use Resources

Let's take the example of niter. People formerly used it for the extraction of saltpetre only. The remaining "waste" liquid and "waste" residue were discarded. However, through synthetic utilization, 8 to 9 products, all in large quantities, are now produced using these wastes. For instance, every 1,000 chin of niter yields 30 chin of hydrochloric acid, 8 chin of potassium chloride, 5 chin of magnesium chloride, 5 chin of calcium chloride, 35 chin of nitrate and 110 chin of synthetic fertilizer. In 1959, the plant produced 256 tons of hydrochloric acid alone; 554 tons of potassium nitrate from refining of saltpetre, and 2,420 tons of chemical fertilizers from niter. These are all items urgently needed by our agriculture and industries.

### B. Synthetic Utilization Is An Important Approach Toward Lower Cost and Higher Profit

Taking synthetic utilization of niter as an example, if 1,000 chin of niter is used to make saltpetre alone, it will be worth about 10 yuan. However, through synthetic utilization the total products will be valued at 50 yuan. The value has been raised four times, but the cost has been lowered, and the profit is three times higher than before. Through synthetic utilization, the plant was able, in 1959, to produce 1.475 million worth of products, of which 900,000 yuan were profit and 600,000 yuan was handed to the commune itself. This represented 80% of the total welfare fund the commune has received. So the commune has increased its economic position, improved the living standard of its members, expanded its industrial production and purchased several scores of machines.

## VIII. OBTAINING BASIC RAW MATERIALS FOR EPOXY RESINS FROM WASTE GASES OF LIQUID MATERIALS

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In the process of preparing epoxy resins, the Harbin Chemical Industrial Laboratory has recovered the waste acid from the synthetic reaction of diphenylpropane. The by-product hydrogen chloride is used to prepare dichlorohydrin. Such measures have saved them large quantities of sulfuric acid, hydrochloric acid, and other basic raw materials.

The production of diphenylpropane in the laboratory uses 72.5% sulfuric acid as catalyst which was formerly discarded after first use. Therefore, a large quantity of sulfuric acid which is still very rich was wasted. The new process uses 94.5% industrial sulfuric acid to mix with the discarded 65% acid, forming 72.5% sulfuric acid as the catalyst. The result is excellent. Every ton of diphenylpropane produced may bring back 3.6 tons of 60-65% waste sulfuric acid. Since part of the phenol and acetone in the waste acid which was unreacted will react, it will yield a 15-20% higher collection efficiency. Hydrogen chloride which is used to produce dichlorohydrin was previously made with concentrated sulfuric acid and hydrochloric acid. Therefore, the consumption of the two acids were very heavy. The new process uses the waste hydrochloric acid from other products, which saves 900 tons of concentrated sulfuric acid and 500 tons of concentrated hydrochloric acid annually. These measures not only lower the cost of epoxy resins, but also solve the problem of waste gas handling.

#### IX. ONE THOUSAND CHEMICAL FACTORIES TO SPRING FROM 40 DAYS OF STRENUOUS EFFORT IN HARBIN

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The Chinese Communist Party's Harbin Committee recently conducted an all people's chemical industry on-the-spot conference at the Hsiang-fan People's Commune. Comrade Lu Chi-en, the Party's Secretary who is also the mayor of the city, first made a report on the progress of chemical industry development, and then called upon all the people to create an all people's chemical industry movement to mobilize the strength of the city and to "create 1,000 factories by a 40 day strenuous effort by all the people in the city."

The mobilization of all the communes and other concerned units started immediately after the call of the Secretary. The Hsiang-fan People's Commune decided to establish 140 chemical plants in addition to the present foundation and produce 330 items by the first of May. The Tai-ping people's commune is also determined to establish 130 chemical plants and produce 100 products within 40 days. These plants will synthetically use 30 kinds of raw materials and save 5 million yuans for our country.

X. T'IENT-YUAN 60 TYPE ACID RESISTANT HIGH PRESSURE  
PORCELAIN PUMP EXPERIMENTALLY PRODUCED

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T'ien-yuan, Chemical  
Factory

The experimental T'ien-yuan 60 type acid-resistant high-pressure porcelain pump which was designed by the T'ien-yuan Chemical Factory has been successfully produced and the testing results show excellent performance. The pump, which has a speed of 3,000 rpm, 45 meter water head, and a capacity of 400 liters per minute is three times more efficient than a single-face centrifugal pump. The advantages of such a pump are: close-type casing to prevent the crushing of pump blades, higher acid resistant capability than stainless steel, and a cost only one third that of stainless steel.

XI. HOW WE REACHED THE TEN TON PER DAY RATE IN THE  
PRODUCTION OF SMALL CONTACT METHOD SULFURIC ACID

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The Lanchow Sulfuric  
Acid Factory

Under the leadership of the Party, the members of the Lanchow Sulfuric Acid Factory have vigorously carried out the technical reform and revolution movement and rapidly increased the production of sulfuric acid. In March of this year, we modernized the No 1 and No 2 converters in our 400 ton small contact method sulfuric acid equipments into a double deck converter and changed the cyclone dust removal to a dust filter. The adoption of these features have since solved the long time low production, low conversion ratio, and converter clogging problems. On 23 March, No 4 furnace made a record rate of 7,795 kilograms per day; on the 28th of the same month, No 5 furnace broke that record and made a new one of 10,850 kilograms per day (the average production rate of No 5 furnace during the period from 23 to 30 March was 5,111 kilograms per day). The following report will introduce the features of the technical innovation which brought about the record production rate.

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