OPEN ACCESS
INTERNATIONAL JOURNAL
EIJMRMS
Next Scientists
European International Journal of Multidisciplinary Research and Management Studies
SJIF 5.954 2022

EUROPEAN INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND MANAGEMENT STUDIES
ISSN: 2750-8587
DOI: https://doi.org/10.55640/eijmrms-02-04-21

https://eipublication.com/index.php/eijmrms
Volume: 02 Issue: 04 April 2022
Published Date:- 20-04-2022

Page No.-108-112

POSSIBILITIES OF USING A CHEMICAL EXPERIMENT ON THE FORMATION OF STUDENTS' CRITICAL THINKING COMPETENCIES

Mehriddin A. Kuchkarov

Lecturer, Tashkent state pedagogical university named after Nizami, Uzbekistan

ABSTRACT: - This paper describes the possibilities of further enhancing the developmental, critical thinking skills of students by making changes to the form and content of the chemical experiment in the general secondary education system. The organization of chemical experiments in accordance with real industrial processes is another tool to ensure that chemistry education is linked to practice.

KEYWORDS: Chemical industry, training laboratory, imitation, pyrite, catalyst, contact method, zinc raw, oleum.

INTRODUCTION

Chemistry has a special responsibility for the development of the chemical industry and the economy as a whole. This load is even greater when it comes to the direction of the chemical experiment. Chemistry education plays an important role in educating professionals who are able to come up with scientific, innovative ideas, put their knowledge and ideas into practice, and make informed decisions. As in other fields, the foundation for the development of the chemical industry will be laid in the school laboratory. Therefore, it is important that the content of laboratory and practical training in the general secondary education system is consistent with current industrial processes. In particular, the processes of industrial production of chemical products (such as sulfuric acid, ammonia, nitric acid, soda, glass), which it plays an important role in industry, should be reflected in training laboratories. Although the devices do not

look exactly like industrial equipment departments, the processes that take place here should imitate the state of the industry.

THE MAIN RESULTS AND FINDINGS

There are many differences between the current curricula. The balance between school chemistry experimentation and industrial production processes, seeing exactly the problems that exist in this regard, has become a modern requirement, which greatly helps to develop students' ability to solve life problems.

Subject of laboratory work: Obtaining sulfuric acid

Purpose: To recieve sulfuric acid by industrial method (by contact method of FeS_2 pyrite)

Required equipment: test tubes, glass tube, rubber tube, alcohol lamps, rubber stopper, clamp, tripod, large diameter glass tube, glass

Required reagents: FeS_2 (pyrite), Cr_2O_3, water (dist), NaOH solution, phenolphthalein, $BaCl_2$ solution.

Theoretical part. In the contact method, the production of sulfuric acid is carried out in three stages.

Stage 1. Metal sulfides (FeS, FeS_2-pyrite, ZnS-zinc raw (raw material)) or SO_2 are obtained by oxidation (burning) of sulfur.

$$4FeS_2 + 11O_2 = 2Fe_2O_3 + 8SO_2$$

Stage 2. SO_2 is oxidized using a catalyst (V_2O_5 or Cr_2O_3):

$$2SO_2 + O_2 \xrightarrow{V2O5 \text{ or } Cr2O3 \text{ cat } (450\ ºC)} 2SO_3$$

Stage 3. SO_3 is absorbed by concentrated sulfuric acid (98%) to obtain oleum.

$$SO_3 + H_2SO_4 = H_2S_2O_7 \quad (H_2SO_4 \cdot SO_3)$$

(oleum)

Then the oleum is dissolved in water to produce sulfuric acid. When SO_3 is released directly into the water, a mist (H_2SO_4 vapor) is formed.

It is obtained according to the following scheme.

$$FeS_2 \xrightarrow{+O_2} SO_2 \xrightarrow{V_2O_5 \text{ or } Cr_2O_3} SO_3 \xrightarrow{+H_2O} H_2SO_4$$

The order of work.

(Note: carry out the process in a pipe cabinet)

Add pyrite (FeS_2) to the test tube and close the mouth with a stopper. Connect the other end of the tube with a stopper to a large diameter glass tube filled with Cr_2O_3 (catalyst, ammonium dichromate can be decomposed in the laboratory). Dip one end of the tube into a glass of water. Assemble the device as shown in the picture. First, heat the catalyst tube slightly with an alcohol lamp, and then start heating the pyrites solution.

A litmus paper can be placed on the mouth of the tube in the glass to show that redness has formed an acid. When a solution of barium chloride is added to the solution, the formation of a white precipitate also indicates the formation of sulfuric acid. Remember to remove the tip of the pipe from the water before stopping the heating. Otherwise, when the tube cools, the pressure inside will decrease and it will draw water, and the hot glass may burst when water touches it.

Figure 1. Sulfuric acid extraction device according to the contact method in the laboratory

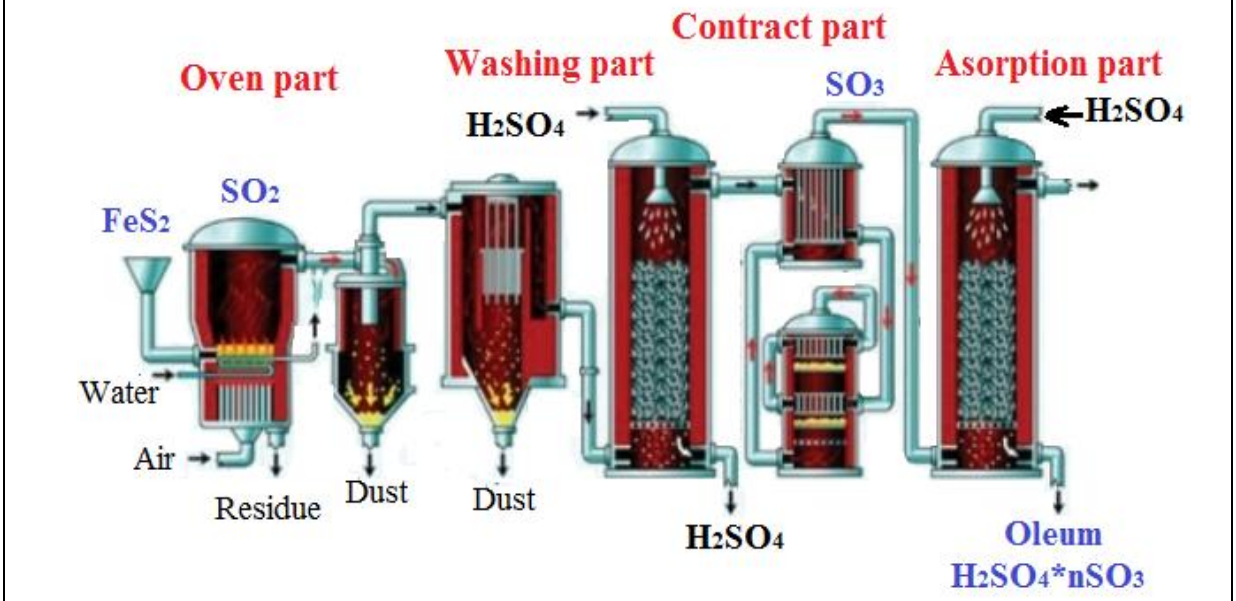

Figure 2. Device for the production of sulfuric acid by contact method in industry

Once the processes are compared in the general case, the stages of sulfuric acid production can be compared.

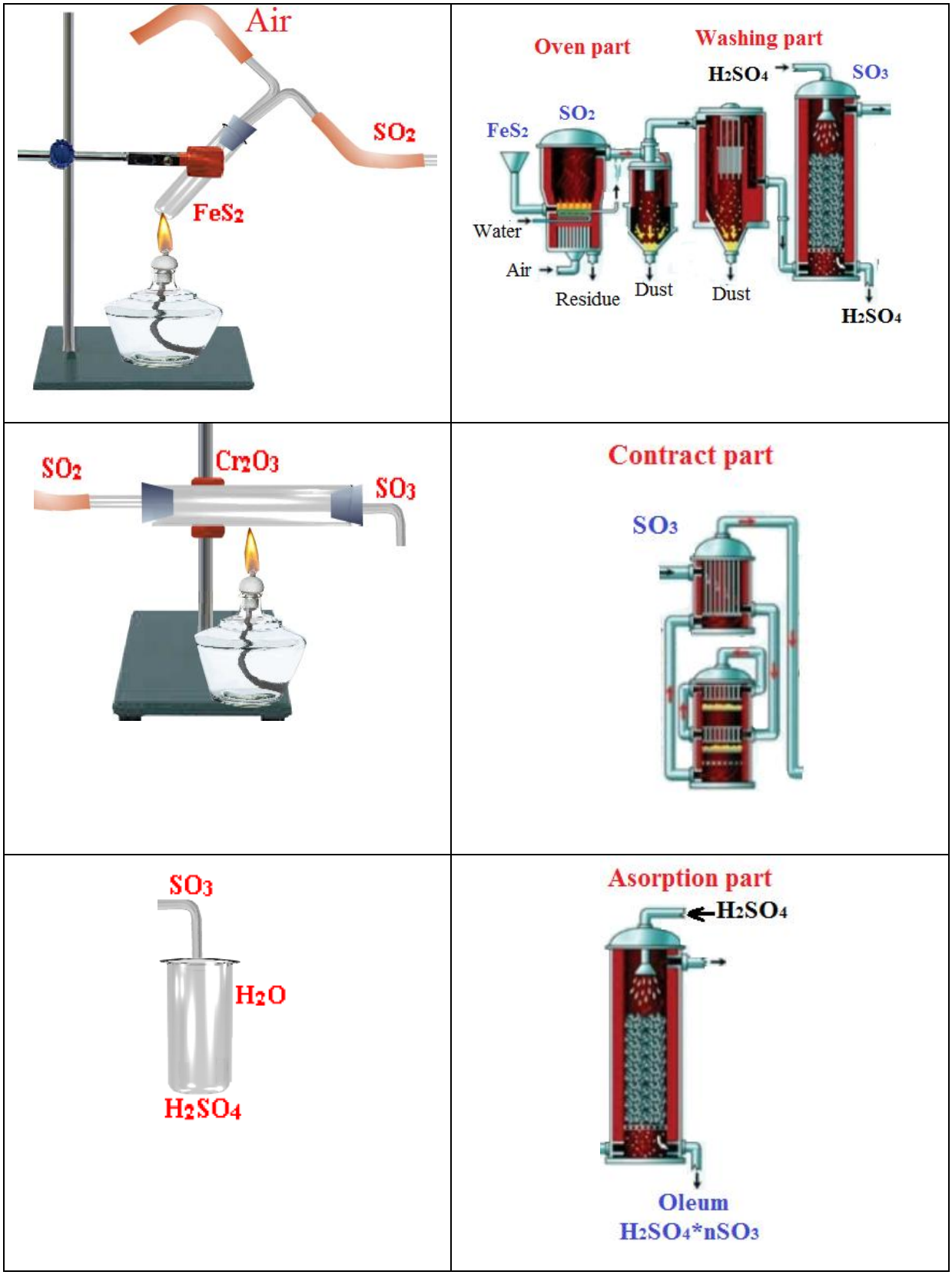

Figure 3. Comparison of stages of sulfuric acid production in laboratory and industry

CONCLUSION

In the organization of experiments on the synthesis of substances (especially the synthesis of substances that play an important role in the economy), the use of raw materials, which can be selected on an

industrial scale at cost, with sufficient natural resources, the proper organization of the stages of the process also plays an important role in the formation of correct perceptions in students and in the formation of critical thinking, teaching them to solve life problems.

References

1. Askarov P., Gopirov K., Tukhtaboyev.Kh. Chemistry. Textbook for 8th grade. 2019. Tashkent “Uzbekistan” NMIU.
2. Polosin V.S., Prokopenko V.G.Practicum on the method of teaching chemistry. – M., 1989.
3. Tretyakov Yu.D. Practicum on inorganic chemistry.– M .: Higher school, 2004. – 384 p.
4. Tsvetkov L.A. Experiment on organic chemistry in middle school. Techniques and methods. –M .: School Press, 2000. – 192 p.
5. Voskresenskiy P.I. Techniques laboratory works. –L .: Chemistry, 1970. –720 p.
6. Kuchkarov M.A., Goziyev S.I. Assembling tools and equipment for a chemical experiment. –T .: Science and technology, 2010. – 32 p.
7. Kuchkarov M.A. Some recommendations for solving the shortage of chemical reagents and equipment // Pedagogical education. – Tashkent, 2007. –No.5. –Pp. 36-37.
8. Mamaeva, E. A., Isupova, N. I., Masharova, T. V., & Vekua, N. N. (2021). Modeling in the environment of three-dimensional graphics as a method of forming students' critical thinking. *Перспективы науки и образования*, (2), 431-446.
9. Nechypurenko, P., Evangelist, O., Selivanova, T., & Modlo, Y. O. (2020). Virtual Chemical Laboratories as a Tools of Supporting the Learning Research Activity of Students in Chemistry While Studying the Topic" Solutions". In *ICTERI Workshops* (pp. 984-995).