OBTAINING SUPERPHOSPHATE CONTAINING MICRO ELEMENTS FROM NON-FERROUS METALLURGY WASTE

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Abstract: This article describes the possibility of using microelement wastes of the metallurgical industry in the production of necessary fertilizers for the purpose of increasing fruits and vegetables on the basis of ensuring food safety, as well as micronutrient fertilizers containing phosphorus in the phosphorous fertilizer industry.

Key words and phrases: fertilizer, mineral fertilizer, phosphorus fertilizer, trace element, metallurgical waste, zinc, zinc evaporation, zinc dissolution in acid, superphosphate.

Аннотация: В данной статье рассмотрена возможность использования микроэлементных отходов металлургической промышленности в производстве необходимых удобрений с целью увеличения плодоовощной продукции для обеспечения пищевой безопасности на основе микроэлементных удобрений в промышленности фосфорсодержащих удобрений.

Ключевые слова: удобрение, минеральное удобрение, фосфорное удобрение, микроэлемент, металлургические отходы, цинк, испарение цинка, растворение цинка в кислоте, суперфосфат.

The main issue of ensuring food security is to increase the amount of agricultural products. To do this, plant growth fertilizers should be increased, mainly for fruits and vegetables. The basis of the development of agrarian industry is the agricultural sector.

The lack of organic fertilizers leads to an increase in the demand for mineral fertilizers. Depending on the type of fertilizer, it is solid, liquid, simple and complex. It is necessary to use high-quality and high-concentration types of

mineral fertilizers in order to maintain the amelioration condition of the soil with agrotechnical processing after planting.

In addition, improving the quality of mineral fertilizers and increasing their agrochemical efficiency is one of the urgent tasks of chemical technology. Fertilizers containing trace elements (manganese, zinc, copper, nickel, etc.) are important for increasing the agrochemical efficiency of applied mineral fertilizers, increasing crop yields and improving the quality of the products obtained. Because these fertilizers play an important role in the strength, demand of the plant organism.

The process of production of complex microfertilizers, which is considered important for increasing yields, has practically not been implemented in recent years, mainly due to the lack of cheap and affordable raw materials. In this regard, the use of waste or secondary products containing metals of the trace element group, which are found at various enterprises of the metallurgical and non-ferrous metallurgy, is required. Based on this, it was determined that zinc vapor can be a raw material with high potential and easy to use.

When analyzing the existing non-ferrous metallurgy of the Republic of Uzbekistan, the waste of various microelements that are found in them open up opportunities for use in the production of microelement-containing mineral fertilizers. If we see zinc vapor among them, then they are in the form of zinc oxide (colorless crystals); density 5,7 g/cm^3, turns yellow when heated, does not liquefy, evaporates in the form of vapor at temperatures above 1800°C and is considered zinc vapor. It is an amphoteric substance that forms salts in acids, soluble in alkalis and aqueous ammonia. They are formed at zinc plants mainly during the purification of substances from additives. Its composition in % is as follows: Zn – 54,6; Fe – 0,4; CI – 1,4; F – 0,08; Cd – 0,57. Zinc vapor contains zinc mainly in the form of oxides and sulfides.

This substance can be used as a microfertilizer raw material at enterprises for the production of superphosphates in the mineral fertilizer industry, and it is also

possible to obtain microfertilizer superphosphate. To study this, the Central Kyzylkum thermal concentrate was used (P_2O_5 – 25,68 %; CaO – 53,28 %; CO_2 – 2,68 %; MgO – 1,22 %; F – 2,76, R_2O_3 – 3,58 %; SO_3– 5,01%) and 93% sulfuric acid. This can be seen with the use of them in technology, superphosphate is obtained. To do this, initially as a result of the interaction of evaporation of zinc with thermal orthophosphoric acid under conditions (Solid:liquid) S:L=1:5÷1:10, the following reaction occurs:

$$ZnO + 2H_3P0_4 = Zn(H_2PO_4)_2 + H_2O$$

$$ZnSO_4 + 2H_3P0_4 = Zn(H_2PO_4)_2 + H_2SO_4$$

It can be said that the extraction phosphoric acid (22,5% P_2O_5, 1,95% AI_2O_3, 1,55% Fe_2O_3, 1,60% MgO, 1,5% F, 2,0% SO_3) of the enterprises of Almalyk “Ammophos-Maxam” also interacts with zinc.

As a result of tests, it was found that the mixing time can positively influence the dissolution of zinc in acid. With increasing stirring time from 15 to 120 minutes, the degree of release of zinc oxide changes from 40,1 to 87,7%. Under such conditions, when the acid concentration was increased to 30.0%, the conversion of zinc to acid was 99,4%. Therefore, to ensure the active participation of zinc in zinc vapor in the process, the ratio of liquid and solid phases should be in the above ratio. Since these ratios do not exist during the production of superphosphate, zinc in zinc vapor is very difficult for the plant to absorb. Because according to the technology of obtaining superphosphate, its ripening period increases from 20 days.

To solve this problem, you can use the method of reducing the ripening period of superphosphate. When analyzing these cases, the following results were obtained: To solve this problem, you can use the method of reducing the ripening period of superphosphate. When analyzing these cases, the following results were obtained:

№	Dependence of the rate of transition of zinc into the absorbed form on time, %			
	5 day	10 day	15 day	20 day
	In a simple mixing method			
1.	5	12	22	28
	When mixing with a screw mixer			
2.	24	65	87	94

Zinc can currently be used when the plant uptake rate is over 80%. Therefore, superphosphate microfertilizers obtained by this method can be introduced into production.

Literature used:

1.Тураев З., Романова С.И., Хакимова В.К. Извлечение цинка из цинкового возгона растворами аммиака и промывной серной кислотой. – Узб.хим.журн., Деп. в ВИНИТИ № 252 – В – 86. – 6 с.

2. Абдуназаров, Ф. А., Тураев, З., & Дехканов, З. К. (2018). ГРАНУЛЯЦИЯ НИТРАТА КАЛЬЦИЯ ПОСЛЕ ДОБАВКИ БЕНТОНИТОВЫХ ГЛИН. In *Advances in Science and Technology* (pp. 79-80).

3.Тураев, З., Шамшидинов, И. Т., Усманов, И. И., & Мамадалиев, Ш. М. (2020).Исследование взаимодействия сульфатов меди, цинка и кобальта с монокальцийфосфатом при 30 и 80° с. *Universum: химия и биология*, (1 (67)), 21

4.Тураев, З., Хакимова, В. К., & Тухтаев, С. (1985). Взаимодействие оксида меди с фосфатами аммония. *Уз. хим. журнал*, (4), 43.

5.Исакова, О. М., Тураев, З., & Усманов, И. И. (2020). ИЗВЛЕЧЕНИЕ НИКЕЛЯ ИЗ ОТРАБОТАННЫХ

6.Turaev, Z., Shamshidinov, I., Usmanov, I., & Samadiy, M. (2020). Studies of the Solubility of Copper, Zinc and Cobalt Sulphates in Ortophosphoric Acid at 30 and 80

7.Шамшидинов, И. Т., & Тураев, З. (2015). Технология производства сульфата алюминия из вторичных каолинов в промышленных условиях. *Europaische Fachhochschule*, (6), 87-90.

8.Mirzakulov, IT Shamshidinov, Z. Tu'rayev.Theory and technological calculations of complex fertilizer production.T.:A place of contemplation. 2013.

9.Shamshidinov, I., Qodirova, G., Turayev, Z., & Mamurov, B. (2020). Study Of The Process Of Heat Treatment Of Lımestone To The Process Of Obtaınıng Calcıum-Magnesıum-Contaınıng Phosphorous Fertılızers.

10.Уктамов, Д. А., Казакова, С. З., Таджиев, С. М., & Тураев, З. (2020). Микроэлемент содержаший нитрофос. *Life Sciences and Agriculture*, (2-3), 30