

## 3D-METAL COORDINATION COMPOUNDS - BIOSTIMULATORS GROWTH

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**Abstract.** The paper presents some aspects of coordination of transitive metals (cobalt (II), copper (II), nickel (II), oxovanadium(IV), manganese (II), zinc, iron (II) with dihydrazide of semicarbaziddiacetic acid (Dig)  $\text{H}_2\text{N}-\text{C}(\text{O})-\text{NH}-\text{N}(\text{CH}_2\text{CONHNH}_2)_2$  (Dig) studied by elemental analysis and physicochemical methods. based on the data we obtained a structural diversity of combinations and possibilities of coordination of ligands. Study various biological properties showed that synthesized salts can serve as stimulators of extracellular amylolytic enzymes biosynthesis and increase the efficiency of obtaining biomass.

**Keywords:** metals transitive, dihydrazide semicarbaziddiacetic acid, stimulate biosynthetic

### 1. Introduction

Coordination of transition metal compounds with polyfunctional polydentate ligands and form a field of study of theoretical and applied chemistry. Among them are the metal chelates with organic ligands containing atoms of oxygen, sulfur, nitrogen - electron donor and acceptor energy. In particular it advises making complex salts with special importance for various branches of the national economy (agriculture, mechanics, pharmaceutical, etc.). Interest of the study was to ligands containing several coordination centers capable of forming different combinations so complex composition, structure, properties as well as chemical, biological potential, such as thio- and semicarbaziddiacetic acids

### 2. Material and methods

For the synthesis of coordination compounds have been taken that neutral salts of nickel (II), oxovanadium(IV), manganese (II), zinc, iron (II) and dihydrazide of semicarbazid- diacetic acid  $\text{H}_2\text{N}-\text{C}(\text{O})-\text{NH}-\text{N}(\text{CH}_2\text{CONHNH}_2)_2$  (Dig) [1]. Synthesis was performed in solutions of alcohol and / or methyl. Direct interaction of metal salts listed with Dig various compounds were obtained according to the general scheme:  $\text{MeX}_2 + \text{Dig} \xrightarrow{\text{CH}_3\text{OH}, \text{H}_2\text{O}} \text{MeDigX}_2 \cdot n\text{H}_2\text{O}$ ;

where Me –  $\text{Co}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Mn}^{2+}$  (X = Cl); Me –  $\text{Fe}^{2+}$ ,  $\text{VO}^{2+}$  (X =  $\text{SO}_4^{2-}$ ); n = 1, 2

Composition and structure of substances was determined by elemental analysis, various physico-chemical and physical methods (IR Spectroscopy, thermogravimetry, X-ray spectra) has determined that combinations achieved. It was researched and their biological activity on intracellular hydrolases biosynthesis of various fungal species: *Penicillium viride* (Producent pectinases), *Aspergillus niger* 33 (Producent amylase), *Rhizopus arrhizus* (Producent lipases). The tests have been performed with the solutions of different concentrations of the suggested substances in individual selected conditions for each strain through known methods in enzymology.

Combinations of cobalt (II) and copper (II) showed good growth regulators, namely action "retard" germinated corn on immutable processes of photosynthesis.

### 3. Results and Discussion

The utilization of complex combinations of the transition metals with polyfunctional, polydentate ligands in the biosynthetic process in biology, medicine, animal breeding, agriculture is just present-day problem.

It also regulates the most important biochemical processes occurring in living organisms. Attempts microbiological research showed that complex substances can be used as stimulating biosynthesis of many biologically active substances: proteins, enzymes, vitamins etc [2,3].

Evaluation of biological properties of substances taken have shown that these influences differently the biosynthesis and activity hidralaze different species, depending on source fermentative system (STAM-producent).

On the basis of the achieved tests were found, that some obtained coordination compounds manifested weak inhibitory properties ( $\text{ZnDig}(\text{NO}_3)_2 \cdot \text{H}_2\text{O}$ ), and others - stimulators of biosynthesis intracellular amylolytics ferments

Therefore, for micromycete *Aspergillus niger* 33 – producent of amylases the best stimulator has been proved to be the complex combination  $\text{VODigSO}_4 \cdot 2\text{H}_2\text{O}$ , and  $\text{Co}(\text{Dig})(\text{NCS})_2 \cdot 2\text{H}_2\text{O}$  (tab.1).

**Table 1.** Dihydrazids influence of 3d metals on *Aspergillus niger* 33 fungal biomass yield

The Substance used	Biomass, g/L			% of control		
	1	5	10	1	5	10
$\text{Co}(\text{Dig})(\text{NCS})_2 \cdot 2\text{H}_2\text{O}$	11,85	16,01	13,45	93,30	124,12	94,38
$\text{Co}(\text{Dig})\text{Cl}_2 \cdot 4\text{H}_2\text{O}$	11,65	14,00	13,10	91,70	108,52	91,92
$\text{VODigSO}_4 \cdot 2\text{H}_2\text{O}$	11,08	14,75	16,30	87,20	121,60	114,38
$\text{ZnDig}(\text{NO}_3)_2 \cdot \text{H}_2\text{O}$	9,73	11,55	13,15	76,57	89,53	92,28
Control	12,70	12,90	14,25	100,0	100,0	100,0

Based on the investigation it was found that more effective biostimulation by dihydrazides proposed solution concentration is 5 g/l [4].

### 4. Conclusions

The accumulated results give the possibility to describe thoroughly the mechanism and the properties of influence of the proposed complexes upon the biosynthetic processes of the microbiological systems.

### References

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