



POISONING BY METHANE AND CARBON MONOXIDE: METHODS FOR ANALYZING CARBOXYHEMOGLOBIN IN BLOOD

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Abstract Poisoning by methane (CH_4) and carbon monoxide (CO) is one of the critical issues in modern toxicology due to the high toxicity and widespread occurrence of these gases, which increase the risk of exposure. This paper examines the mechanisms of methane and carbon monoxide poisoning, their effects on the body, and the chemical and physicochemical methods for detecting carboxyhemoglobin (HbCO) in blood.

Keywords: Methane (CH_4), Carbon Monoxide (CO), Physicochemical Methods, Chemical Methods, Electrochemical Methods, Spectroscopy.

Mechanisms of Poisoning by Methane and Carbon Monoxide

Methane Poisoning

Although methane is an inert gas, inhaling it at high concentrations can lead to hypoxia. Methane displaces oxygen molecules, resulting in oxygen deficiency in the body. This condition often occurs in confined environments or during work in deep mines.

Carbon Monoxide Poisoning

Carbon monoxide binds strongly to hemoglobin, forming carboxyhemoglobin (HbCO). HbCO has a binding affinity 200 times greater than oxygen, effectively reducing oxygen transport. This leads to hypoxia and systemic disorders that can result in death. Initial symptoms of carbon monoxide poisoning include dizziness and headaches, but later stages can involve loss of consciousness and respiratory arrest.

Methods for Analyzing Carboxyhemoglobin

Chemical Methods

Spectrophotometry This method uses the absorption properties of HbCO at specific wavelengths of light. HbCO absorption peaks are at 541 and 579 nm. Blood samples are analyzed in a hydroxide solution to determine HbCO concentration.

Gasometric Analysis The composition of gases extracted from blood is analyzed. This method is employed to precisely measure the amount of CO. Gasometric analysis is conducted using modern instruments.

Physicochemical Methods

Infrared Spectroscopy This technique analyzes HbCO's spectrum in the infrared range. Infrared spectroscopy distinguishes HbCO from other forms of hemoglobin.

Electrochemical Methods Electrodes are used to measure CO levels in the blood. These methods are highly accurate and sensitive, suitable for rapid analysis. Modern electrodes use biomimetic materials, enhancing the detection efficiency of HbCO.

Mass Spectrometry This method determines the mass of CO and HbCO molecules to measure their concentrations. Mass spectrometry is preferred in situations requiring high precision. Its advantage lies in analyzing small sample volumes.

Chromatographic Methods Gas chromatography is used to separate and identify HbCO and other gases. This method yields highly accurate results.

Treatment of Poisoning Cases

Addressing Hypoxia

Oxygen therapy or hyperventilation is used to increase oxygen levels in the body. This method enhances the availability of unbound oxygen in the bloodstream.

Hyperbaric Oxygen Therapy

Administering oxygen under high pressure accelerates the dissociation of HbCO from hemoglobin. This method is particularly effective in severe cases.

Detoxification Agents

Medications that neutralize toxins in the body are administered. In some cases, specific drugs are added to restore normal hemoglobin function.

Preventive Measures

Installing detectors in areas with potential carbon monoxide emissions and providing workers with protective equipment can help prevent poisoning incidents.

Conclusion Poisoning by methane and carbon monoxide poses life-threatening risks. Employing modern analytical methods to detect HbCO enables effective diagnosis in the early stages of poisoning, thereby improving treatment outcomes and preventing complications. Implementing preventive measures is equally essential to safeguard against poisoning incidents.

REFERENCES

1. Nizomiddinovich T. F. et al. EXPERIMENTAL MYOCARDIAL INFARCTION LDH BILAN CORRECTION OF NATHIJALARI: Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari //Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari. – 2024. – T. 6. – №. 1. – C. 63-68.
2. Nizomiddinovich T. F. et al. QON TOMIR KASALIKLARIDA ENOSNING O'RNI: Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari //Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari. – 2024. – T. 6. – №. 1. – C. 56-62.
3. Sh, Xushnazarov Z., L. Kenjayeva, and F. N. Toshboyev. "PIRRILO [2, 3-D] PIRIMIDINLARNING BIOLOGIK FAOLLIGI." *TADQIQOTLAR. UZ* 39.5 (2024): 30-35.
4. Sh X. Z., Toshboyev F. N., Izatullayev S. A. PIRIMIDIN HALQASI ISHTIROKIDA SINTEZ VA PIRIMIDINNING BIOLOGIK FAOLLIGI //TADQIQOTLAR. UZ. – 2024. – T. 38. – №. 5. – C. 28-34.
5. Toshboyev F. N., Tashanov O. S., Izatullayev S. A. Oziqa tarkibidagi spirtlarni oksidlanish jarayonini matematik modilashtirish orqali xisoblash //golden brain. – 2023. – T. 1. – №. 28. – C. 117-120.

6. Toshboyev F. N., Iskandar o'g'li M. S., Fayzullo o'g'li S. S. XITOZAN VA SUT ZARDOBI BILAN OZIQLANTIRILGAN BROYLER JO'JALARINING BIOKIMYOVIY KO'RSATKICHLARI //Ta'lim innovatsiyasi va integratsiyasi. – 2024. – T. 14. – №. 1. – C. 78-80.
7. Toshboyev F. N. et al. SELECTIVITY OF YKS CATALYZATION IN THE SYNTHESIS OF VINYL ACETATE FROM ETHYLENE AND ACETIC ACID //World of Scientific news in Science. – 2023. – T. 1. – №. 2. – C. 31-35.
8. Nizomiddinovich T. F., Abdimannonovich I. S., Zoirovich A. J. Of organic substances by thin layer chromatographic method //Ta'lim innovatsiyasi va integratsiyasi. – 2024. – T. 14. – №. 1. – C. 70-72.
9. Toshboyev F. N., Bobokulova S. A., Suyunova M. O. Synthesis of vinyl acetate from acetylene with the participation of a nanocatalyst and study of its kinetics //World of Scientific news in Science. – 2024. – T. 2. – №. 2. – C. 11-18.
10. Тошбоев Ф. Н., Ахмадов Д. З., Эшанкулов З. А. Динамика нитрергической системы при гиперхолестеринемии //Ta'lim innovatsiyasi va integratsiyasi. – 2024. – T. 14. – №. 1. – C. 73-77.
11. Baykulov A. K., Toshboyev F. N., Akhmadov J. Z. BIOCHEMICAL AND PHYSIOLOGICAL CHANGES IN PARASITE PARAMETERS IN THE HOST-PARASITE RELATIONSHIP //Modern Scientific Research International Scientific Journal. – 2024. – T. 2. – №. 1. – C. 257-262.
12. Xudoyberdiyev I. I. et al. Etilen va sirka kislotadan vinilasetat olinishi jarayonining fizik-kimyoviy asoslari //Zamonaviy fan va ta'lim yangiliklari xalqaro ilmiy jurnal. – 2023. – T. 1. – №. 5. – C. 59-62.
13. Toshboyev F. N., Akhmadov J. Z., Eshonqulov Z. A. ETHYLENE OXYACETYLATION REACTION KINETICS LEARN //Modern Scientific Research International Scientific Journal. – 2024. – T. 2. – №. 1. – C. 253-256.
14. Тошбоев Ф. Н., Анваров Т. О., Изатуллаев С. А. ОПРЕДЕЛЕНИЕ PH СРЕДЫ ЛЕКАРСТВЕННЫХ ВЕЩЕСТВ ПОТЕНЦИОМЕТРИЧЕСКИМ

МЕТОДОМ //World of Scientific news in Science. – 2023. – Т. 1. – №. 1. – С. 166-169.

15. Baxodirovich S. S., Nizomiddinovich T. F., Ergashboevna E. M. GAZ ARALASHMALARINI NAZORAT QILISHNING TERMOKATALITIK USULI //Journal of Universal Science Research. – 2024. – Т. 2. – №. 2. – С. 276-281.

16. Байкулов А. К., Муртазаева Н. К., Тошбоев Ф. Н. ДИНАМИКА ВЛИЯНИЯ ЛАКТАТДЕГИДРОГЕНАЗЫ ПРИ ЭКСПЕРИМЕНТАЛЬНОМ ИНФАРКТЕ МИОКАРДА //World of Scientific news in Science. – 2024. – Т. 2. – №. 3. – С. 244-251.