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Evaluation of change color as a function of time of amines using cobalt (II) thiocyanate for forensic applications

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The identification of drugs by colorimetry is characterized by the reaction of inorganic complexes due to the amines present in these illicit substances. Commercial colorimetric tests can give false negatives or false positives. However, research related to colorimetric studies that aim to identify illicit drugs is still little explored. The Scott test, widely used to identify illicit drugs such as cocaine hydrochloride due to the presence of tertiary amine. In the Scott test, a solution of cobalt thiocyanate ($Co(SCN)_2$) in an acidic medium is used, which, in the presence of cocaine, produces a blue-colored cobalt II complex [1,2]. After the reaction, the color may change as a function of time due to the balancing chemical effect of the substance produced. Therefore, it is necessary to control of the balancing chemical of amines present in relation to the time of exposure to air. In this work, color variation studies were carried out by UV-vis spectrophotometry to evaluate which amines can undergo color variation as a function of time. For this study, solution containing $Co(SCN)_2$ was prepared to evaluate the reaction with the amines such as ethylamine, diphenylamine and triethylamine. The time evaluated in the study of color variation after mixing each complex and each amine was 45 min. Zero time was considered at the moment of mixing between the complex and amines. A change of pink to blue was observed at zero time when mix $Co(SCN)_2$ with amines. Color changes can be attributed to the variation of coordinate water molecules [3,4]. The effect of the reaction time for each amine was evaluated with 5 min of interval. According to spectrum of ethylamine, the absorbance decreased until 30 min and after that, remained approximately constant with slight blue color change. This same tendency was also observed to triphenylamine, after 40 min. However, for diphenylamine, the reaction time for reach the balancing chemical was constant after 5min maintaining the initial blue color. Therefore, a color test response can be obtained in few seconds in the presence of amines and the substances can be stored without color change. These amines have the same organic groups when compared to illicit drugs and, based on the results obtained, the colorimetric test will be used for testing in the presence of illicit drugs in the future

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References

[1] M. De Jong, A. Florea, J. Eliaerts, F. Van Durme, N. Samyn, K. De Wael, Anal. Chem. **90**, 6811–6819, (2018)

[2] V.N. Conceição, L.M. Souza, B.B. Merlo, P.R. Filgueiras, R.J. Poppi, W. Romão, Quim. Nova. **37**, 1538–1544, (2014)

[3] R. Haddoub, D. Ferry, P. Marsal, O. Siri, New J. Chem. **35**, 1351–1354, (2011)

[4] A. Argente-García, N. Jornet-Martínez, R. Herráez-Hernández, P. Campíns-Falcó, Sensors Actuators, B Chem. **253**, 1137–1144, (2017)