Abstract

The phenomenon of drug resistance and cancer are the growing problems for contemporary medicine struggles with every year. Therefore, new pharmaceuticals with a broader spectrum of biological activity are being sought. There are several approaches to designing such molecules, e.g. based on the molecular targets, which may be a DNA biomolecule.

One of the commonly used group of compounds in medicine are sulfonamides, which have antibacterial properties. They can be modified to increase the spectrum of action. In this way, compounds can exhibit antiviral, anti-inflammatory and even anticancer properties. Additionally, due to the presence of atoms capable of transferring an electron pair in sulfonamide molecules, they can coordinate with biologically important metal ions, which may also increase the biological activity of pharmaceuticals.

The aim of this dissertation is to determine the influence of the alkylamine substituent length on the bactericidal properties of sulfonamide derivatives and their ability to attach to Ru(III) and Rh(III) metal ions. The sulfonamide derivatives studied were 4-amino-N-(2-aminoethyl)benzenesulfonamide (NethylS), 4-amino-N-(2-aminopropyl)benzenesulfonamide (NpropylS) and 4-amino-N-(2-aminobutyl)benzenesulfonamide (NbutylS). One of the possible paths to designing new preparations is to introduce changes to existing compounds. For this purpose, the electrochemical profiles of sulfonamide derivatives were analyzed in protic and aprotic environments, which allows for the determination of the molecules behavior in biological systems. In addition, the acid-base properties of the compounds and pK_a values were determined. This made it possible to define their protolithic forms. The ability of sulfonamide derivatives to form coordination binders with Ru(III) and Rh(III) ions was also studied. The manner and strength of the interaction between analyzed compounds and the DNA helix was assessed using the switchSENSE technique, which allows determining of the kinetic parameters of the ongoing processes. The antioxidant properties of sulfonamides with $ABTS^{\bullet+}$ and $DPPH^{\bullet}$ radicals were also analyzed, that helped determine the compounds' ability to scavenge reactive oxygen species (ROS). Their cytotoxicity and activity against selected *G(+)*, *G(-)* bacteria and yeasts were also studied.

The research carried out will expand knowledge about sulfonamides, which will allow the proposal of new structures with high biological activity.