Physico-chemical properties of compounds such as solubility, lipophilicity and permeability play the important role in the study of drug absorption, farmacokinetic behavior and toxicity of drugs. There are many approaches to predict lipophilicity [1] and many corresponding computer programs to calculate partition coefficients for neutral compounds in the system octanol/water. For all that different methods for the predicting logPoct values are still developed. Most of these programs are based on additivity schemes that use isolated atom or the molecular fragment contributions. Such approaches do not always give accurate prediction [2].

As to calculating the solubility of compounds in water and their permeability through different biological membranes the situation is more complicated. There are several publications concerning these properties.

Accordingly in the MOLPRO PROject group attacked the problem by creating the computer program SLIPPER (Solubility, LIPophilicity, PERmeability). SLIPPER calculations are based on the phisico-chemical properties of compounds steric bulk, H-bonding and electrostatics.

It was proposed [3] that partition coefficients encode two major structural contributions: a volume-related term (describing steric bulk effects) and a term that reflects such interactions as dipole-dipole and hydrogen bonding. But the authors of [3] couldn't check this assumption because at that time there was no way quantitatively estimate the H-bonding strength. The systematically investigated H-bonding for the last 20 years [4-10] allowed us to create the program HYBOT (Hydrogen Bond Thermodynamics) [11,12] for calculating original H-bond descriptors.

HYBOT

- Hydrogen bond thermodynamics database (experimental free energy and enthalpy of hydrogen bonding complex formation in various solvents);

- Hydrogen bonded factors database (calculated in framework of common hydrogen bonding scale H-bond parameters (factors))

- The program which calculates the H-bond factors of compounds on the basis of

experimental data

-    The program which predicts the H-bond factors of any compounds on the basis of chemical structures

The creation of HYBOT allowed us to develop the concept to quantitatively describe of solubility, lipophilicity and permeability of compounds based on volume-related term and H-bond strength. In 1997 we created the program SLIPPER which calculated lipophilicity (including a profile of logP-pH dependence) and solubility in water. Then the idea of creation such a program complex has developed and the software SLIPPER was created on the shell of chemical databases support CheD. This approach gives us the opportunity to use all the advantages of the shell for manipulating databases and our unique method for prediction of lipophilicity, solubility and absorption on the basis of structure similarity and physico-chemical properties of compounds.

Here we present the new software SLIPPER-2001 the current version of which calculates lipophilicity (logD), including a profile of logD-pH dependence, aqueous solubility (logSw) for different pH and intestinal absorption in human (FA).