# RETURN OF OLEUM TEREBINTHINAE FROM NIHILITY TO PHARMACEUTICAL PRACTICE IN THE FORM OF EMULGEL

Shiryayeva O. V, Herbina N. A., Smorodska V. E.
Scientific supervisor: Dmitriyevskiy D. I., PhD, professor
National University of Pharmacy, Kharkiv, Ukraine
ddmitrey@mail.ru

**Introduction.** The history of application of coniferous trees resin, of which turpentine is now produced, has thousands of years. Currently, purified turpentine as a curative and restoring remedy has found wide application in officinal and folk medicine. The most widely purified turpentine is used in preparations for local administration in sciatica, neuralgia, myositis, rheumatism, gout and other inflammatory diseases, as well as for the preparation of recovery baths. The disadvantage of most topical preparations (ointments and liniments) is their hydrophobic nature, as well as insufficient dispersion of turpentine as a hydrophobic substance in water when preparing baths - on the water surface it is in the form of a film.

**Aim of the study** was the development of chemist's technology of turpentine emulgel для for its subsequent use in the composition of therapeutic baths, and also as a basic dosage form to obtain complex preparations of this natural remedy, which production will be carried out according to the prescriptions of doctors in pharmacies with a production function, the number of which in Ukraine increases year after year.

**Materials and methods.** In the work, such materials have been used: turpentine purified (*Oleum Terebinthinae rectificatum*), gelling agents (carbomer 934P and sodium carboxymethylcellulose (Na-CMC)), oleic and stearic acids, 10% solutions of ammonia and sodium hydroxide. As emulsifiers in the work have been used oleates and stearates of ammonium and sodium, obtained during the interaction of the acids and alkalis used. The quality of obtained emulsions and emulgels was evaluated by their thermal and colloidal stability, and also microscopically.

**Results and discussion.** Due to the fact that the production of stable concentrated turpentine emulsions by a common method of dispersion at heating was complicated because of turpentine volatility, in our study we have used the method of physical-chemical dispersion at room temperature, in the course of which the acid (oleic or stearic) neutralization reaction by alkali (ammonia or sodium hydroxide) occurs simultaneously, the result of which is the formation of salts, which are emulsifiers of emulsions of the o/w type. Preparation of emulsion systems is done by active agitation in a closed vessel of acid solution turpentine with alkali solution or gel pH>8,0. The main problem to be solved in the development of the method was

determination of the ratio of mutually reacting acid and alkaline ingredients. The problem was solved using calculation method from reaction:

$$C_{17}H_{33}COOH + NH_4OH \rightarrow C_{17}H_{33}COONH_4 + H_2O.$$

The acid and alkali, participating in the reaction should be used in equimolecular quantities with a little excess of alkali, that might me controlled by the value of pH.

To increase the stability of the emulsions obtained, a gel former (carbopol 934P or sodium carboxymethyl cellulose) has been introduced into their dispersion hydrophilic medium. The introduction of the gelling agent is carried out at the stage of preparation of the hydrophilic phase. When using carbomer as a gelling agent, the amount of alkali used should be increased to neutralize its carboxyl groups, which is also controlled by the pH value.

The obtained stable emulsions of turpentine of type o/w with a content of 20-70% of the hydrophobic phase are well diluted with any amount of water (in the preparation of baths), and can also be used as a base for the preparation of combined preparations containing essential oils, analgesics, nonsteroidal anti-inflammatory agents, etc.

Below is given an example of the preparation of 200 g of the emulgel containing 50% turpentine purified and 1% carbopol in the hydrophilic phase: 2 g of oleic acid are added to 100 g of purified turpentine and the mixture is stirred until uniform (hydrophobic phase).

In another container, a dispersion of 1 g of carbopol in 45 ml of water is prepared, to which a calculated amount of 10% NH4 OH (or NaOH) solution is then added.

Both phases are combined and emulsified at a speed of 3000 rpm until a homogeneous white mass is obtained.

In the absence of mixing devices in a pharmacy (blender, mixer, etc.) the emulsification stage might be performed in a vial having it closed tightly and shaking vigorously for 2-3 minutes. The last stage to be conducted is deaeration, that is removal of air bubbles that were emulsified at vigorous shaking. The presence of these bubbles influences the volume of the emulgel and its texture. This operation is by vacuumation of the container with prepared product.

The most favorable storage conditions of the prepared emulgel are as follows: at temperature 8-15°C in a dark place. At dispension from a pharmacy the preparation is additionally labeled “shake before use”.

**Conclusions.** The technology for producing turpentine emulgel with a content of this product 20 to 70% has been developed. As emulsifiers, have been used salts of oleic or stearic acid, obtained as a result of the interaction of the acids used with alkalis. To increase the stability of the emulsion systems obtained, their dispersion medium is thickened with gelling agents.