The determination of the dynamic capacity of the sorbents was performed according to the following procedure. A glass-fiber swab was placed inside a column with a diameter of 7 mm and a capacity of 5 ml. Thereafter 0.5 g of the sorbent were placed inside the column. Then another glass-fiber swab was placed from other side in order to immobilize the sorbent within the column. The flow rate of a solution of Au^{+3} passing through the sorbent was equal to 2.5 ml min^{-1}. 25 ml portions of it were collected and subsequently analyzed by an atomic absorption spectroscopy.

An electrochemical method of a gold sorption investigation

The kinetic sorption curves of Au^{+3} were obtained by recording the current (I) vs. time (t) curves at a constant potential corresponding to the limiting current of Au^{+3} electroreduction on a platinum electrode.

The experiments were conducted as follows. 20 ml of the test solution of Au^{+3} of a predetermined concentration were placed in the electrochemical cell. The latter was connected through salt bridges filled with a saturated KCl solution with the compartments of a silver chloride reference electrode and an auxiliary platinum electrode. An indicator platinum electrode was inserted in the cell, which was then put on a magnetic stirrer. The latter was turned on. A potential of + 0.2 V (Ag/AgCl in a saturated KCl solution) was applied to the indicator electrode using P-5848 potentiostat. The exact value of the potential corresponded to the region of the limiting current of Au^{+3} electroreduction on a platinum electrode [28]. Then the value of the limiting current was recorded.

After 0.5min-1 min a portion of a sorbent equal to 0.2g-0.5g was introduced to the electrolytic cell. Subsequently, the reduction current decreased indicating a decrease of the concentration of Au^{+3} in the electrolyte solution. This determined the form of the I vs. t curve. The duration of the ions removal visualized by the curve slope ranged from 4 min to 20 min. The time dependence of Au^{+3} percentage in the solution was plotted on the basis of the kinetic I vs.t curves.

A samples investigation by an electron microscopy

The electron-microscopic examination of the samples was carried out on a JEM 100CX instrument with an accelerating voltage of 100 kV. A film substrate was prepared aiming observation by an electron microscope. The following methods were used to prepare the samples: (a) suspension methods carried out with various suspension liquids (a simple suspension, an ultrasound affected suspension preparation and suspended particles introduction (an aerosol method)); (b) dry preparation methods (simple and with chemical etching).

Preparation of CAS

The preparation of the carbonized apricot stones was carried as follows. Apricot stones obtained in Almaty, Kazakhstan, were washed with distilled water and then dried at 60°C. Then they were ground to obtain a fraction of about 2 mm $< D_p <$ 6 mm. The samples were carbonized in a horizontal furnace under a flow of argon with a flow rate of 100 cm^3 min^{-1} at a temperature of 500°C for 1 h (Fig. 1) using a heating ramp of 10 °C min^{-1}. The CAS samples were cooled, washed several times with hot water and dried at 105°C. Finally, the CAS samples were crushed and sieved to 100 μm.

RESULTS AND DISCUSSION

Equilibrium Studies

Ref. [29] shows that the carbon sorbents obtained on the basis of carbonized natural materials possess ion-exchange and reducing properties. The CAS stationary potentials are measured aiming to determine the samples reducing properties. This is done with the help of an electrode of a special design. It has a fluoroplastic holder with a diameter of 20 mm and a thread at the end of the

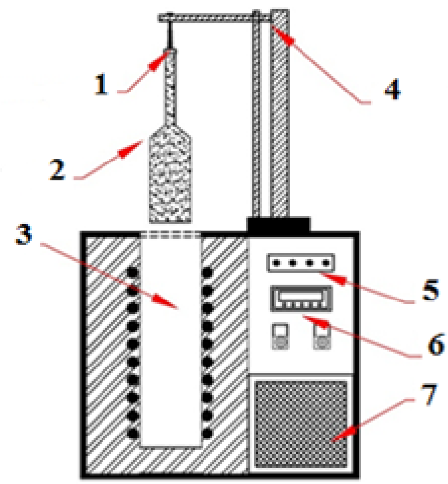

Fig. 1. A schematic diagram of the self-built carbonization setup: 1 – an over pressure valve; 2 – a metal reactor; 3 - a furnace heating zone; 4 - an automatic elevator; 5 - an elevator control; 6 - a thermal controller; 7 - a transformer block.