to use this sorbent for organic acids preconcentration from water solutions with following HPLC determination because it displays stability under water vapour influence.

Zn phthalocyanines sorbs FOA less effectively compared to Ni phthalocyanines, which is due to partial destruction of a bond with the complex surface during methanol desorption. In eluting mix through sorbent containing Zn phthalocyanine, the latter shatters, and the longer the process, the less it is possible to model analysis results.

Minimal FOA concentration, which can be determined in model solution at standard concentrating procedure, is $3x10^{-5}$ mg/l. It is possible to use metal phthalocyanines as sorbents during organic acids extraction from water solutions. HPLC methods with preconcentration are proposed to evaluate organic acids by means of solid-phase extraction on a sorbent with a surface layer of Cu phthalocyanines with extraction effectiveness of 78 %.

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WATER CONTROL TECHNOLOGY FOR PRODUCTION WELLS

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Unwanted water production is a major challenge for oil and gas wells. Problems arise when water production exceeds the economic level (water/oil ratio). In this case, oil production is almost unprofitable [3]. Produced water can be divided into two types. The first type includes water coming from injection wells or active aquifers that contribute to oil displacement from a reservoir. The second type includes water coming to a well and produced without oil or with oil output insufficient to cover water disposal costs. Water of the second type can occur in a particular well for a variety of causes. Table 1 shows a simplified classification of problems, although they may occur in more combinations in practice [2].

Table 1

Classification of Problems Associated with Excess Water Inflows

Problem	Cause:	Solutions for wells	
		Vertical	Horizontal
1. Leaks of casing, tubing or packer	- aging wells - technological reasons - corrosion	- use of insulating fluids, plugs, cement bridges, and packers - use of casing patches	
2. Leakage behind casing	- low-quality cement sheath - voids in casing annulus	- use of insulating plugging fluids	
3. Oil-water contact (OWC) movement	- very low vertical permeability	- plugging lower perforation holes using mechanical systems	- horizontal sidetracking
4. Watered interval without flows between layers	- a highly permeable interval, bounded by aquitards from above and below	- using inelastic insulating fluids or mechanical insulators	- this problem does not affect horizontal wells drilled only to a producing reservoir
5. Fractures or faults between injection and production wells	- fractured or porous-fractured reservoirs, branched fracture networks	- injection of gels - water shut-off (the best solution to this problem)	

This problem is typical for oil and gas fields at late development stages. It leads to loss of productivity, higher cost of oil and increased well water-cut. One of the ways to solve this problem is to conduct water shut-off treatment in oil and gas wells by injecting chemicals that can be filtered into a porous medium and plug pathways of unwanted water into the well [2].

There are a lot of chemicals that can be used for water shut-off treatment, but the final choice depends on the cause of water production, a place from which water comes, and petrophysical parameters of a producing reservoir. However, most water shut-off materials were found to be ineffective in field tests.

Chemical water shut-off must provide the following results:
- injected chemicals must completely fill water pathways;
- the chemicals must create a water barrier that ensures sufficient resistance in subsequent well operations without being destroyed under current depression conditions;
- water shut-off treatment must not deteriorate flow properties of the oil-saturated portion of the reservoir;

In this case, chemicals and solutions must:
- be chemically inert to rocks and pipe metal;
- be cheap and commercially available;
- guarantee not only high efficiency of shut-off treatment, but also safety at work;
- comply with applicable environmental requirements;

- have an optimal viscosity for penetration into low-permeability rocks;
- be suitable for any season and easy to use.

Two gelling agents used in the oil industry for water control were chosen for this study: monomeric compounds, polyacrylamides, and biopolymers.

Monomers (acrylamide, styrene diphenylmethane, polyamides 6 and 6.6, adhesives, and impregnation resins) can easily penetrate the pores of the reservoir due to its low yield strength. It has been found that the overall behavior of the water barrier created by the monomer is very similar to the behavior of polyacrylamide, but the former one is associated with a lower containment pressure. However, they are excellent candidates for gels, since they penetrate deep into the reservoir and block pathways of water.

Effective crosslinkers for polyacrylamide (PHPA) are trivalent metal ions, such as aluminum (Al^{+3}) and chromium (Cr^{+3}). These crosslinking agents can be simple inorganic ions in a solution or soluble chemical complexes [4].

The key value of biopolymers is determined by their ability to dramatically change rheological properties of aqueous systems (increasing viscosity, gelation) even at low concentrations. Compared to the water-soluble synthetic polymers traditionally used in oil production, biopolymers have a number of significant advantages, including those that allow them to be used in very severe environments where synthetic polymers are inefficient.

It should also be taken into account that most chemicals are used in various combinations, rather than in pure form.

For successful and high-quality introduction of gelling agents, self-selective water shut-off in production wells is proposed [3]. This technology is based on a consistent three-step chemical treatment.

The first step is protecting oil reservoirs with microfiber particles — a viscous solution that creates an impermeable filter cake in areas with low permeability for oil reservoirs, but keeps fractures open to ensure the penetration of the polymer gel. Required fluid properties: the particle size of fibrous materials should be carefully chosen so that it is small enough and freely penetrates through fractures, but large enough to form an external filter cake. The second step is injecting the gelling agent: it should be injected immediately after the first step, under a pressure less than the fracture pressure. The gel will penetrate and plug only fractures, since low-permeable rocks are already protected with the impermeable filter cake of the first fluid. At the final step, after the gel has solidified, the generating filters and gelling polymers should be removed from the wellbore in order to restore the oil flow and well productivity. All operations are performed under high pressure and temperature [1].

Thus, the water control technology with water shut-off materials significantly restrict pathways of unwanted water into the production well, thereby reducing water production, as well as water treatment and disposal costs.

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GEOCHEMICAL AND MINERALOGICAL FEATURES OF INTRUSIVE ROCKS, EL SELA AREA, EGYPT

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The intrusive rocks encompasses two-mica granite, microgranite, dolerite and bostonite were investigated in El Sela area. The XRF, ICP-MS, scanning electron microscope and electron microprobe microanalyses are the different techniques used to identify the geochemical and mineralogical features of El Sela intrusive rocks. Geochemically, Al2O3, TiO2, MgO, MnO, CaO, P2O5, Fe2O3, Ni, Sr and Y have a marked decreasing trend with increasing SiO2. The four groups are enriched in large ion lithophile elements (LILE; especially Ba and Rb), whereas dolerite and bostonite are enriched in high field strength elements (HFSE; especially Y and Zr). They have developed with alkali feldspar fractionation trend but dolerite developed in straddle zone between pyroxene and biotite trend. They exhibit Calc-alkaline affinity except dolerite belongs to tholeiitic one. These rocks fall in meta- and/or peraluminous characteristics whereas bostonite fall in peralkaline magma. The studied granites fall in syn-collision volcanic-arc granites whereas dolerite and bostonite were emplaced in within-plate regime under extensional anorogenic environment. REEs concentrations are enriched in LREEs in the studied intrusive rocks relative to heavy ones with higher values in post-granitic dikes. They have a marked negative Eu anomaly but the microgranite samples show no sign of Eu anomaly. The two-mica granite contains high Th-contents whereas microgranite has the highest U-contents. Th has a marked positive correlation with Zr rather than U. Both U and Th have a negative