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IOPC performs both fundamental and applied research in various fields of chemistry.

#### LATEST DEVELOPMENTS AT IOPC INCLUDE:

- > Technology for extracting useful products from plant raw materials;
- > Synthesis of novel polymer materials for integrated optoelectronics; and
- > New methods for synthesis, analysis and application of non-racemic compounds.

#### SELECT HIGHLIGHTS OF RESEARCH & DEVELOPMENT EFFORTS AT IOPC

**Phosphorus Chemistry:** The chemistry of organophosphorus compounds, is the most important branch at IOPC. Other areas of expertise include:

- > Dual reactivity of phosphorus derivatives with the P-El bonds (with El = B, N, Al, Si, S, Hal, O);
- > New types of rearrangement of organophosphorus compounds, including low-coordinated phosphorus atom derivatives;
- > Novel reactions yielding unique heterocycles in optically active organophosphorus compounds with high stereoselective yield; and

- > Synthesis of new non-standard polyfunctional organophosphorus ligands and their use in the molecular design of metal complexes with specific three-dimensional architecture.

Discovery at IOPC has resulted in the development of phosphorus-containing medical products: 'Pyrophos' for the treatment of glaucoma, the antifungal ointment 'Chloracetophos', the drug for metabolic therapy with wide range of activity 'Dimphosphon', and the antitumor remedy 'Glycyphon'. IOPC researchers are also developing new environmentally friendly technology for the synthesis of organophosphorus compounds from elemental phosphorus via metal complex catalysis.

#### Organic Supramolecular

**Chemistry:** IOPC is a leader in the field of organic supramolecular chemistry and chemistry of fullerenes. Research is focused on the design of both rigidly pre-organized and flexible molecular structures on the basis of functionalized macrocyclic compounds (calyxarenes and calyx[resorcin]arenes). These structures are able to self-

organize and bind to substrates with selectivity close to that of natural receptors, as well as to participate in the processes of recognition, transport and catalysis. IOPC is recognized worldwide as the premier Russian research center in supramolecular chemistry.

#### Chemistry of Macro- and

**Heterocyclic Compounds:** IOPC is well-known for its achievements in the field of heterocyclic compounds synthesis, which resulted in the creation of a series of biologically-active medications: anti-burn and immunomodulatory remedy 'Xymedon', medication 'Diuciphon' against leprosy, as well as the growth-control medication 'Melaphen'. IOPC researchers have also produced the medications, 'Triaphen', 'Phenocyl', 'Neophenocyl', which are more efficient than conventional widely used analogs.

#### Geochemistry, Chemistry and Refinement of Oils and Bitumen:

Due to the location of IOPC in Kazan, the capital of the oil-producing Republic of Tatarstan, geochemistry and petroleum chemistry, including oil and bitumen refining, represents a significant field of research.

Infrastructure at IOPC includes the laboratory for biological investigations with vivarium; facilities for the optimization of pilot technologies scale-up for chemical production. Various workshops, nitrogen-oxygen cryogenic station and auxiliary units ably support the Institute.