

Training of Highly Qualified Personnel for Higher Educational Institutions and Corporations of People's Republic of China at the Ufa State Petroleum Technological University

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In the given review some aspects of cooperation of the Ufa State Petroleum Technological University in training highly qualified personnel for higher educational institutions and corporations of People's Republic of China are considered.

The Ufa State Petroleum Technological University cooperates with higher educational Institutions, scientific organizations and corporations since 1989.

An agreement on trading, economic, scientific and technological cooperation between the Governments of the Bashkortostan Republic of the Russian Federation and the Liaoning Province of P.R. China for a term of 5 years with automatic prolongation was signed on February 25, 1999 in Moscow.

Over the past time the governmental delegations of the Bashkortostan Republic and the Liaoning Province exchanged good will visits during which the questions of mutually beneficial cooperation including educational sphere were discussed.

Our main partners in P.R. China are:

- China National Oil and Gas Corporation;
- China Petrochemical Corporation "SINOPEC";
- Liaoning University of Petroleum and Chemical Technology.

The results of the long-term cooperation are:

- probations of oil engineers at USPTU;
- training at the magistrates and post-graduate course (10 persons have already defended their theses);
- translation of the text-books and training methodical aids of the professors of the graduating chairs into China;
- delivering a cycle of lectures;
- cultural exchange;
- conduction of mutual scientific conferences;
- joint edition of text-books, publications of scientific articles.

The Liaoning University of Petroleum and Chemical Technology will serve as a binding link between USPTU and China Corporations while carrying out joint scientific and technological researches at the joint Centre of the Liaoning University and USPTU set up in February, 2004 in China. It should be added that the questions of training the probationers, magistrates's students and post-graduates of P.R. China are also discussed during the business trips of the USPTU employees into Moscow, at the meeting with the officials at the Representatives of the China National Oil and Gas Corporation in the Russian Federation.

The data on the Candidate theses defended by the representatives of P.R. China higher educational institutions and Corporations at USPTU are presented in Table 1.

Table 1
The data on the Candidate theses defended by the representatives of
P.R. China at USPTU

N	Name	Date of Defence	Place of Defence	Title of the Candidate Thesis	Name of Supervisor of Studies	Name of Official Opponents	Leading Organizations
1	Mei Yaolun	June 24, 2002	Ukhta State Technological University	The Study of Structural and Lithological Peculiarities of the South-Eastern Part of the Shkapovsky Oil Region Based on the Seismic Survey Data MOGT – 2D	Doctor of Geologic Sciences, Professor of the Chair of Geology A.V. Sidnev	Doctor of Geol. Sc., Prof. A.I. Dyakonov Cand. of Geol.Sc., Senior Research Worker P.H. Masagutov	Oil and Gas Producing Office “Aksakovneft”, Join Stock Independent Co. “Bashneft”

Scientific novelty of the thesis research consists in solving the problem which is of great applied significance for some regions and territories (States):

1. The possibility of reinterpreting the archives data of the low-frequency seismic survey MOGT – 2D based on the modern computer technologies and processing programmes Focus, Geovectour-Plus, Landmark et al. have been proved.
2. For the first time a new complex of charts for the part of the Shkapovsky Oil Region is made up: reduced velocities, isochrones, extreme amplitudes and efficient formations along the reflecting horizons D2 and D1 on 1:50000 scale. This considerably changes the conception of the territory and allows making a step forward in its scientific cognition.
3. Interpretation problem on forecasting reservoir spreading in a low-rate terrigenous and carbonate rock mass of the Timansky horizon is solved as a first approximation. The obtained reflections of the top of the Kynovsky horizon (D1) and the bottom of the Biysky horizon (D2) when correlating them by the wave package form considerably alleviate the problem of “lithological dismemberment” of the main productive member of the top and middle Devonian horizons.
4. Considerable changes and additions to the procedure of wave field interpretation with regard to dynamic characteristics of seismic sections – instant frequencies and instant amplitudes – are made.

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2	Zhao Lin	Sept. 20, 2002	Ufa State Petroleum Technological University	Formation and Development of the Catalytic Reforming Process	Doctor of Engng. Sciences, K.G. Abdulminev	Doctor of Engng.. Sciences., N.H. Valitov, Cand. of Engng.Sc. Y.M. Maksimenko	The State Unitary Enterprise “Institute of Petrochemical Refining” Academy of Science of the Bashkortostan Republic

Scientific novelty of the work consists in considering for the first time the formation and development of catalytic reforming in the world during the period of 1911 – 2000 both in historical and technological aspects.

For the first time technological characteristics of the units for producing high-octane components of automobile gasoline with reduced aromatic hydrocarbon content, including benzene and sulphur are summarized and analyzed.

N	Name	Date of Defense	Place of Defense	Title of the Candidate Thesis	Name of Supervisor of Studies	Name of Official Opponents	Leading Organizations
3	Zhang Huiying	October 10, 2002	Ufa State Petroleum Technological University	A Rise in Efficiency of Developing High-Viscosity Oil Pools with the Use of Biocomplex Effect	Doctor of Engng. Sciences, Professor of the Chair of Geology N. S. Khairetdinov	Doctor of Engng. Sc V.I. Khisamudinov, Cand. of Engng.Sc. G.H. Yakimenko	Oil and Gas Producing Office "Aksakovneft", Joint Stock Independent Co. "Bashneft"

Scientific novelty of the work:

1. On the basis of the I.G. Permyakov's method the recovered reserves and their structure of the Yasnaya Polyana pools of the Moskujdjinsk oil field are specified.
2. For the first time biocomplex effect on the Yasnaya Polyana pool as an example is suggested to raise high-viscosity oil recovery factor of the Moskujdjinsk oil field.
3. For the first time the polynoms for approximating a curve relationship "inverse number of the accumulated fluid withdrawal – accumulated oil production" is suggested for raising evaluation accuracy of efficiency in using methods of increasing oil recovery.

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4	Wan Lijun	December 06, 2002	Ufa State Petroleum Technological University	The Effect of Fractional Composition of Oil Distillates on the Indices of Oil Production Processes	Doctor of Engineering Sciences, Professor of the Chair of Oil and Gas Engineering P.L. Olkov	Doctor of Engng. Sciences N.G. Nigmatullin Candidate of Sciences S.V. Balakireva	The State Unitary Enterpris "Institute of Petrochemical Refining"

Scientific novelty

1. Comparative analysis procedure of selective refining distillates of wide and narrow fractional composition is developed. It allows making an impartial efficiency evaluation of refining distillates of narrow fractional composition at equal level of viscosity.
2. It is found that "model" distillates of wide and narrow fractional composition possess an equal dissolution temperature and index of refraction at equal level of viscosity.
3. Synergetic effect of increasing raffinate yield when using mixed N-MII/ furfurole solvent is

determined. Over the range of the solvent ratio mentioned higher raffinate yield as compared with furfural or N-MII treatment is observed. The maximum synergetic effect is observed at solvent composition - furfural: N-MII = 60:40 (wt.). Raffinate yield in this case increases by 4 – 6 % wt.

4. The pour point depression effect of oils with narrow fractional composition obtained when distilling depressed oils of a wide fractional composition is determined (in conjunction with Madzham M.T.) It consists in the fact that the pour point of the obtained oils is lower the pour point of the initial oil.

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5	Zu Bo	December 10, 2002	Ufa State Petroleum Technological University	The Microwave Radiation Effect of Cyclic Acetal And Ether Synthesis	Doctor of Chemical Sciences, V.V. Zorin	Doctor of Chem.Sc. S.S. Zlotsky Cand. of Engng. Sc. A.K. Kurochkin	The Bashkir State University

Scientific novelty of the work

For the first time microwave radiation effect on oxymethylation reactions of olefins of various structures and functionally substituted alkenes is systematically studied.

It is found that microwave radiation intensifies electrophilic oxymethylation of α -olefines, β -olefines, cyclic olefins, allylhalogenides (allylchloride, allylbromide) and complex ethers of allyl alcohol. This effect makes itself most evident in the initial stage of reaction.

It is shown that microwave radiation accelerates formation of 4-alkyl-1,3-dioxanes, 3-alkyltetrahydropyranes – 4 and 2-alkyltetrahydrofuranes in different ways. In the initial stages of reaction selectivity of 3-alkyltetrahydropyranes – 4 and 2-alkyltetrahydrofuranes formation at microwave radiation is higher than at the end of reaction as compared with 4-alkyl-1,3-dioxanes.

It is found that microwave heating efficiency increases in going from more active to less active α -olefines.

It is shown that microwave radiation accelerates reactions of acetylation and nucleophilic substitution, as the result of which acetals and ethers are formed.

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6	Hao Muming	December 18, 2002	Ufa State Petroleum Technological University	Developing Designing Methods and Hydrodynamic Face Seal Designs	Doctor of Engng. Sciences, Professor of the Chair Machines and Apparatuses of Chemical Productions I.R. Kuzeev	Doctor of Engng. Sciences. Y.G. Matveev, Cand. of Engng. Sciences, Senior scientific Worker A.M. Akberdin	Open-end Joint Stock. Co. "Ufaorgsintez"

Scientific novelty

In the given thesis the following main scientific results are obtained:

1. The analysis of the effect of hydromachine technological characteristics on use reliability, tightness and profitability of gas lubrication non-contact face seals is carried out.
2. Regularities of the effect of the end surface design parameters on seal tightness, stability and reliability are determined.
3. Design parameters of seal end surface are optimized by the maximum hydraulic stiffness-to-leakage ratio for gas lubrication non-contact face seals or by the maximum hydraulic stiffness at zero leakage for face seals with reverse injection according to particular operation conditions.
4. On the basis of the results obtained the principles of designing gas lubrication non-contact seals, the methods of choosing an optimum seal design and the programme of designing a seal system providing a certain degree of their tightness, reliability and profitability are presented.
5. New designs of gas lubrication non-contact face seals and face seals with reverse injection are developed and patented.

N	Name	Date of Defense	Place of Defense	Title of the Candidate Thesis	Name of Supervisor of Studies	Name of Official Opponents	Leading Organizations
7	Zhang Dong-chen	December, 25, 2002	Ufa State Petroleum Technological University	Developing Methods of Designing and Constructing Pipelines Laid under Conditions of Rugged Grounds	Doctor of Engng. Sciences, Professor of the Chair "Strength of Materials" L.I. Bykov	Doctor of Engng. Sciences., Prof. I.G. Abdullin, Cand. of Engng. Sciences., S.M Faizullin	Institute of Problems of Energy Resources Transport, Academy of Sciences of the Bashkortostan Republic

Scientific novelty

1. Pipeline behavior with regard to rheological ground properties is studied.
2. Design procedure of stressed state pipelines on the longitudinal slopes at various angles during erection period is developed.
3. Stressed state of a pipeline section under the landslide effect is studied according to the main ground and tube parameters: the values of the landslide force effect; force effect angle of sliding ground; length of the landslide effect section; tube wall thickness. The critical pipeline load under the sliding ground effect is determined.
4. Classification of landslide preventive measures is developed. New structural pipelining diagrammes are suggested for the cases when the underground diagramme is unacceptable.

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8	Liu Xinzhou	March 12, 2004	Ufa State Petroleum Technological University	Development of High-Octane Oxygen-Bearing Fuel Compositions	Assistant Professor of The Chair "Oil and Gas Engineering" M.N. Rakhimov	Doctor of Engng. Sciences., M.Y. Dolmatov, Cand. of Engng. Sciences., Y.M. Maksimenko	The Bashkir State University

Scientific novelty

Phase stability of the most wide-spread high-octane components of commercial gasolines with ethanole is studied and systematized. It is shown that among the high-octane components of commercial gasolines reformat displays maximum stability with ethanole.

Phase stability relationships of reformat-ethanole mixtures to the type and concentrations of aromatic hydrocarbons at various initial mixture ratios are obtained. It is determined that mixture phase stability decreases with increasing number of substitutes in the aromatic ring.

New cosolvents of ethanole-gasoline mixtures on the basis of by-products of 2-ethylhexanole production process and propylene hydroformylation are suggested.

N	Name	Date of Defense	Place of Defense	Title of the Candidate Thesis	Name of Supervisor of Studies	Name of Official Opponents	Leading Organizations
9	Bi Wenjun	May 25, 2004	Ufa State Petroleum Technological University	Increasing Safety Operation Resource of Oil and Gas Pipeline Weld Connections	Doctor of Engng. Sc., Professor I.G. Abdullin, Cand. of Engng. Sc., Associate Professor M.A. Khudyakov	Doctor of Engng.Sc. Professor V.K. Zagorsky, Cand. of Engng.Sc R.G. Ishmurotov	State Unitary Enterprise Institute of Problems of Energy Resources Transport, Academy of Sciences of the Bashkortostan Republic

Scientific novelty

1. Peculiarities of metal mechano-chemical behaviour of welds made by electrodes with rutile and main coating of Russian or China production are determined. It allows determining their corrosion rate and resource under real conditions of pipeline operation. 2. Analytical relationship of fatigue crack growth rate in a weld metal to stress intensity factor combining stages of its delayed and steady growth is obtained. It allows more accurate calculation of residual service life of the equipment operating under conditions of low-cycle corrosion fatigue.

№	Name	Date of Defense	Place of Defense	Title of the Candidate Thesis	Name of Supervisor of Studies	Name of Official Opponents	Leading Organizations
10	Luan Jiagfeng	May 25, 2004	Ufa State Petroleum Technological University	Interchangeability of Corrosion Resistant Steels of 18-10 Grades of Various Countries Production	Doctor of Engng. Sc., I.G. Abdullin, Candidate of Science Associate Professor S.N. Davydov	Doctor of Engng. Sciences., A.G. Khalimov. Candidate of Science R.G. Zaripova	Open-end Joint Stock Co. "Vostok-neftezavod-montazh"

Scientific novelty

1. The choice of chrome-nickel corrosion-resistant steels of 18 -10 grade and their modifications when replacing them by the home and foreign ones for repairing and manufacturing equipment and constructions operating under conditions of chemical and petrochemical corrosion with regard to

their full and approximate analogy according to chemical composition and mechanical properties.

2. It is shown that under conditions of high-temperature oxidation up to 700°C gas corrosion rate and up to 600°C strength properties of 18 - 10 grade steels of Russian, China, Germany and USA production do not depend on their modifications, austenite grain size, degree and character of non-metallic inclusion contamination and can interchange unrestricted. At oxidation temperature 800 – 900°C corrosion rate of such molybdenum modified steels increases 1,5 – 3 times due to formation of easy melting molybdenum oxides and its catalysis effect.

The main difficulty in training China citizens at the post-graduate course consists in their wish to do the theses exceptionally on the basis of the Russian data, whereas their supervisors of studies are interested in the works of comparative character.

Common difficulties for the students of the magistrates and post-graduate course are:

- lack of literature in China;
- difficulties in arranging scientific research training of the magistrates' students in other organizations (scientific research institutes, laboratories, etc.) associated with reluctance to work with foreign citizens and the legislation drawbacks;
- necessity of increasing hours of studying Russian;
- necessity of improving conditions of life, envisaging expenses for business trips, for publishing theses articles, etc.

The University administration takes steps in this direction. Thus the educational supplies and text-books are translated into China at some chairs where there are the magistrates' students and post-graduates from P.R. China. The problem of translation some monographs was discussed with the representatives of the Liaoning University of Petroleum and Chemical Technology for using in the Centre of mutual investigations. It is possible to use the educational supplies "Graphic Models of Oil and Gas Refining Processes" edited by professor Y.M. Abyzgildin translated into China.

For carrying out scientific research training of the magistrates' students and experiments of the post-graduates the possibilities of using the Collective Usage Centre formed on the basis of USPTU.

It is necessary to improve an estimate structure for training foreign specialists in order to solve problems concerning financing the post-graduates' business trips for taking part in scientific conferences.

The first acquaintance of the magistrates' students and post-graduates with the terminology on specialty takes place during their studying at the "Russian Language School". Since that time they visit lectures and seminars of the leading professors of graduating chairs and for the first time meet their future supervisors of studies and determine the topics of their theses.

It should be noted that during studying at the magistrates and post-graduate course the China representatives actively participate in the life of the graduating chairs, carry out joint scientific experiments, write articles and theses of reports, take part in the work and make reports at scientific technological conferences taking place at USPTU and other educational institutions of the Russian Federation, run in new hardware and technologies.

As an example we should cite the fact that for the first time a preliminary thesis defence of a post-graduate of the Chair of Geology Mei Yaolun took place on May 14, 2002 at USPTU. The Candidate for a degree made a report, demonstrated diagrammes, answered the questions of the members of an academic and technological council "Mining and Oil and Gas Production Geology and Geophysics" of the Ukhta State Technological University via a satellite communication in real-time operation.

The camera showed the speaker and numerous graphic applications to his report. The questions and answers rhythmically proceeded from both parts. The studio camera

transmitted not only the process of mutual communication but its emotional nuances as well. At the end of the new type of communication the scientific and technological centre of the Ukhta University approved the scientific work presented to the Council, asserted the official opponents and invited the reporter to the final defence which took place successfully on June 2002. Here are opinions of some supervisors of studies of the work carried out with the China post-graduates.

Professor M.N. Rakhimov notes industry and responsibility of the China post-graduates. Communication with them allowed to widen the knowledge on motor fuel condition in China. The difficulties encountered at presenting material and designing the paper can be overcome if the post-graduates pay more attention to studying Russian.

Professor L. I. Bykov notes efficiency, conscientious attitude to the entrusted work, rhythmical work of the China post-graduates (they seem to be able to work 24 hours a day). It allows them to do the work in time. The communication of the Russian and China post-graduates widens their mental outlook, sets an example of proper work under the thesis, and gives the possibility of joint publications of the obtained results in international editions.

For developing and improving this trend the administration of the University has to select the post-graduate contingent thoroughly with regard to their future specialty. For example, specialty of "Industrial Engineering" obtained in the higher educational institution of Russia has nothing to do with oil and gas education, that is why they have to begin at the beginning and study the specific character of oil and gas profile from the literature being at disposal of their supervisors of studies. Our former post-graduates maintain telephone and e-mail contacts, send messages and photos, tell about their successes. For example, Zhang Dongchen at present is working with the group of China specialists in Kazakhstan and engaging in tank farm reconstruction.

In professor P.L. Olkov's opinion efficiency and purposefulness is the characteristics of China post-graduates. The main difficulties are: insufficient financing of research works and the ban on the acquaintance with technical and economic indices of domestic technological units. Comparative analysis of similar-type units in Russia and China is of interest. One may say about a new scientific trend that has formed at the Chair of Oil and Gas Engineering.

Professor K.G. Abdulminev points out high efficiency and responsibility of the post-graduates, especially at the final stage of preparing theses. He considers that they should pay more attention to technical terminology. The information on the state of technological processes studied and developed in China is of some interest.

An agreement on cooperation with the Shenyang Institute of Chemical Engineering was signed on February 21, 2004 in Shenyang (P.R. China). Now we hope we have got a new partner in P.R. China.

The citizens of China which graduated from the post-graduate course and defended their Candidate theses continue to communicate with their supervisors of studies, the heads of the chairs and the departments of scientific institutes. We look forward to further mutually advantageous cooperation within the limits of Association of Foreign Graduates being established now at the Ufa State Petroleum Technological University.

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