



REPORT

of dissertation for the acquisition of:

educational and scientific degree " doctor "	X
scientific degree " Doctor of Science "	
	the true is indicated by the sign "X"

Author of the dissertation:

		Ivan	Atanasov	Ilchev	Lukoil Neftohim Burgas
academic position	scientific degree	name	middle name	last name	workplace

Topic of the dissertation:

Improving the performance of the Hydrocracking process of vacuum residue in Lukoil Neftohim Burgas AD

Scientific area:

5	Technical sciences
code	name

Professional area:

5.10	Chemical technologies
code	name

Scientific specialty:

Technology of natural and synthetic fuels

The report was written by:

Assoc. prof.	PhD	Vesislava	Borislavova	Toteva	University of Chemical Technology and Metallurgy
academic position	scientific degree	name	middle name	last name	workplace

1. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It is mandatory to fill in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.

Eng. Ivan Atanasov Ilchev fully satisfies the accepted minimum requirements for obtaining the educational scientific degree "doctor". According to the Regulations, at a required minimum of fifty points (Indicator A), he has 50, and according to Indicator G, at a required minimum 30 points, he has 46.1.

Eng. Ilchev presents four scientific publications in journals that are referenced and indexed in the world databases with IF or with SJR. Apart from them, he has one more publication under item 8 (non-refereed peer-reviewed journal or in edited collective volumes). All publications are about doctoral studies. He has ten citations in scientific publications indexed in world-known databases.

2. The relevance of the topic of the dissertation:

A) The topic is relevant and new (there are no known results on the topic by other authors)	8 points	X
B) The topic is relevant and results from other authors are known	6 points	
C) The topic is not relevant, but results from other authors are known	2 points	
D) The topic is not relevant and no results from other authors are known	1 point	
E) The topic does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the dissertation must be substantiated

There is a lack of scientific research data in the literature on the application of vacuum tower bottom (VTB) in road bitumen production and this is evidence that the subject of the present dissertation concerning the improvement of the work of tar hydrocracking process in order to obtain VTB with suitable performance for the production of road bitumen is relevant, new, and has an important practical application.

The need for a high-quality and durable road surface on the infrastructure of Bulgaria is obvious with the ever-increasing land transport and the construction of new highways. It is also important to achieve an even higher conversion of the raw materials for hydrocracking in LNHB, which is also the aim of Eng. Ilchev's dissertation work.

3. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	X
C) Theoretical with application elements	4 points	
D) It does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

4. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
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B) Realistic, but not of scientific and / or applied interest	3 points	
C) Unattainable (unrealistic)	0 points	
		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.

The aim of the present dissertation is to improve the performance of the hydrocracking process of vacuum residues to obtain VTB with indicators suitable to produce road bitumen. For the implementation, the PhD student sets the following tasks, which are **completely realistic and of applied interest**: To investigate the incorporation of atactic polypropylene (aPP) and elemental sulphur to improve the quality of the finished product with the maximum incorporation of vacuum residues; to investigate the application of H-OIL VTB and FCC SLO in different percentage ratios (oxidized and non-oxidized) and sulphur addition in the production of road bitumen and a comparison between their quality indicators to obtain an optimal stock product; Study of the optimal percentage of VTB that can be added for the production of bitumen without interfering with the standardization of the product according to BDS, consistent with the continuously changing blended oils processed in the Lukoil Neftohim Burgas AD refinery and the optimal operating mode of the Hydrocracking of vacuum residue.

5. Contributions of the dissertation:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	X
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.

The achieved results of Eng. Ivan Ilchev have a lasting applied response and are the basis for new research that includes diverse types of petroleum, especially of non-Russian origin, which emerges as the main direction for future scientific experiments. This also includes studies on various additives to influence the oxidation process and the indicators of softening temperature, hardness, etc.

The contributions of the dissertation have an applied nature and are as follows:

1. Permanent implementation of VTB in the production of road bitumen in compliance with all production and state standards. In this way, the conversion of H-Oil is significantly increased and the operation process of the Hydrocracking of vacuum residues on the territory of LNHB is improved.
2. Successfully implemented scheme of work with the addition of non-oxidized VTB in the production of road bitumen. The low-value semi-product VTB without any further processing is added to the road pavement bitumen and increases its yield.
3. Successfully implemented scheme of work with the addition of oxidized VTB in the production of road bitumen. This scheme of operation replaces part of the SRVGO, which instead of going to the production of road bitumen, goes to the production of light fuels of a much higher value in an H-Oil plant without disturbing the operation mode of a Bituminous plant.

4. Due to the seasonal nature of the production of bituminous products, a large part of the experiments was used by the production team to prepare the operating mode of the installation before start-up. This provided preliminary data according to the current types of oil processed at the refinery, which scheme of operation would be most suitable for operation and would bring the most revenue to the company.

6. Conclusion

A) The evaluation of the dissertation is POSITIVE	This evaluation is assigned to a total number of at least 40 points	X
B) The evaluation of the dissertation is NEGATIVE	This evaluation is assigned to a total number below 40 points	
		one of the answers given is marked with the sign "X"

To be filled in at the request of the member of the scientific jury

The topic of the dissertation work of eng. Ivan Ilchev "Improving the performance of the Hydrocracking process of vacuum residue in Lukoil Neftohim Burgas AD" is relevant, new, and has an important practical application. Scientific research is of interest to specialists in the field of fuel technology. Scientific publications are published in prestigious journals and are available to researchers from all over the world. The dissertation shows that the candidate has in-depth theoretical knowledge in the specialty "Technology of natural and synthetic fuels" and was able to conduct independent scientific research and correctly interpret and summarize the results.

The overall assessment of the candidate's work is positive and gives me the reason to propose to the scientific jury that Ivan Ilchev, Eng., should receive the educational and scientific degree "Doctor" in the scientific specialty "Technology of natural and synthetic fuels", Professional area 5.10. Chemical technologies.

Total number of points – 60.

Подпис заличен
Чл.2 от ЗЗЛД

03.10.24	The report was written by:	
date		signature