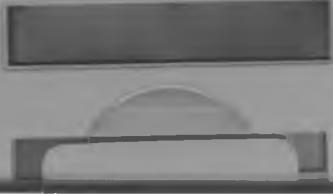


**MOLECULAR PHYSICS**  
**LABORATORY PRACTICUM**  
**IN PHYSICS**



---

AL-FARABI KAZAKH NATIONAL UNIVERSITY

---

MOLECULAR PHYSICS  
LABORATORY PRACTICUM  
IN PHYSICS

Almaty  
«Qazaq university»  
2016

UDC 539.1 (076)

M 79

*Recommended for publication by the Scientific Council  
of the Faculty of Physics and Technology  
and RISO of Al-Farabi Kazakh National University  
(protocol No. I from November 2, 2016 y.)*

**Reviewers:**

Doctor of Physics and Mathematics sciences, Professor **M.E. Abishev**  
Doctor of technical sciences, Professor **A.B. Ustimenko**

**Authors:**

A.S. Askarova, **S.S. Issatayev**, S.A. Bolegenova, V.V. Kashkarov,  
I.N. Korzun, G. Toleuov, Sh.B. Gumarova, L.E. Strautman,  
O.A. Lavrichshev, M.S. Issatayev, Zh.K. Shortanbayeva

M 79    **Molecular physics: laboratory practicum in physics /**  
A.S. Askarova, **S.S. Issatayev**, S.A. Bolegenova, [et. al.].  
– Almaty: Qazaq university, 2016. – 142 p.

**ISBN 978-601-04-2108-0**

This manual describes the laboratory work in molecular physics at the rate of physical workshop. The manual is intended for undergraduate of the Faculty of Physics and Technology of Al-Farabi Kazakh National University.

Published in authorial release.

В практикуме даны руководства по выполнению лабораторных работ по молекулярной физике в условиях физической мастерской и их описания. Предназначен для студентов физико-технического факультета Казахского национального университета имени аль-Фараби.

Издается в авторской редакции.

**UDC 539.1 (076)**

© Askarova A.S., **Issatayev S.S.**, Bolegenova S.A., [et. al.], 2016  
ISBN 978-601-04-2108-0

© Al-Farabi KazNU, 2016

## CONTENTS

INTRODUCTION .....	4
Laboratory work No. 1	
BINOMIAL LAW OF PROBABILITY DISTRIBUTION.....	18
Laboratory work No. 2	
CALIBRATION OF THERMOELECTRIC THERMOMETER.....	32
Laboratory work No. 3	
DETERMINATION OF BOLTZMANN CONSTANT .....	39
Laboratory work No. 4	
DETERMINATION OF SPECIFIC HEAT OF TIN	
CRYSTALLIZATION (MELTING) AND CHANGES	
IN ENTROPY DURING CRYSTALLIZATION .....	46
Laboratory work No. 5	
DETERMINATION OF RELATION $C_p/C_v$ USING	
THE STANDING WAVE METHOD .....	59
Laboratory work No. 6	
DETERMINAITION OF SPECIFIC HEAT OF LIQUIDS BY	
COLORIMETRIC METHOD .....	68
Laboratory work No. 7	
DETERMINATION OF AIR VISCOSITY .....	77
Laboratory work No. 8	
STUDY OF TEMPERATURE DEPENDENCE OF LIQUID	
VISCOSITY .....	95
Laboratory work No. 9	
DETERMINATION OF THE SURFACE TENSION	
COEFFICIENT OF LIQUIDS .....	108
Laboratory work No. 10	
DETERMINATION OF THERMAL CONDUCTIVITY	
OF SUBSTANCES BY COLORIMETRIC METHOD IN	
THE QUASI-STATIONARY REGIME.....	117
APPENDIX .....	124

Educational issue

Askarova Aliya  
Issatayev Sovet  
Bolegenova Saltanat  
Kashakarov Bladimir  
Korzun Irina  
Toleuov Gaziz  
Gumarova Sholpan  
Strautman Lydia  
Lavrichshev Oleg  
Issatayev Mukhtar  
Shortanbayeva Zhanar

**MOLECULAR PHYSICS  
LABORATORY PRACTICUM  
IN PHYSICS**

Typesetting and  
cover design: *G. Kaliyeva*

**IB No.10242**

Signed for publishing 08.12.2016. Format 60x84 1/12. Offset paper.  
Digital printing. Volume 8.87 printer's sheet. 100 copies. Order No.5714.  
Publishing house «Qazaq university»  
Al-Farabi Kazakh National University  
KazNU, 71 Al-Farabi, 050040, Almaty.

Printed in the printing office of the «Kazakh University» publishing house.