

# MOLECULAR DIFFRACTION OF LIGHT

BY

C V RAMAN, M.A., HON. D.Sc.

(Palit Professor of Physics in the Calcutta University)



*Published by the*  
UNIVERSITY OF CALCUTTA  
1922

## Preface

The fundamental importance of the subject of molecular diffraction came first to be recognized through the theoretical work of the late Lord Rayleigh on the blue light of the sky, which he showed to be the result of the scattering of sunlight by the gases of the atmosphere. It is proposed in this small volume to review the present position of the subject and to discuss the general theory of the molecular scattering of light in all refractive media, including in a comprehensive survey the case of gases, vapours, liquids, crystals and amorphous solids. Experimental observations in support of the theory are detailed, and reference is made to various phenomena in which molecular diffraction plays a part. The case of moving media is also briefly dealt with.

In the course of the work, references are made to cases in which the classical wave-theory apparently fails to explain the facts relating to molecular scattering in a satisfactory manner, and in the final chapter an attempt is made to consider these cases in terms of the conception introduced by Einstein in 1905 that light is not continuous wave motion but consists of discrete quanta moving through space.

In the writing up of this essay, I have been greatly assisted by the researchers working in my laboratory, references to whom will be found in the pages below. To these gentlemen, I wish to express my heartiest thanks. I am specially indebted to Mr K R Ramanathan, M.A., Madras University Research Scholar, for very valuable help in the preparation of the volume and in the carrying out of the experimental work. I am also under great obligations to Sir Asutosh Mookerjee, Vice-Chancellor of the University, for the co-operation which made the publication of the volume possible.

I desire also to record my indebtedness to Mr A C Ghatak, B.A., Superintendent of the University Press and his staff for the quick and efficient manner in which the volume has been printed and got up.

*C V RAMAN*

Calcutta  
11th February 1922

## CONTENTS

	Page
CHAPTER I	
Fundamental principles	39
CHAPTER II	
Scattering of light by gases	45
CHAPTER III	
Atmospheric scattering and twilight phenomena	50
CHAPTER IV	
Molecular scattering in liquids	58
CHAPTER V	
The colour of the sea and the albedo of the earth	70
CHAPTER VI	
Scattering of light in crystals	76
CHAPTER VII	
Scattering of light in amorphous solids	80
CHAPTER VIII	
The Doppler effect in molecular scattering	82
CHAPTER IX	
Molecular diffraction and the quantum theory of light	86