

INTRODUCTION

The subject of electrical discharge phenomena has been studied for a very long time and may be said to have given birth to the atomic age. The subject, however, is far from being exhausted and several aspects of the phenomena have received intensive attention in recent years and significant progress has been made.

However, much more investigation is necessary to understand completely the phenomena of dielectric breakdown of gases, specially by radiofrequency electric field, a phenomena which has drawn attention currently, as it serves as a link between discharge phenomena initiated by pure d.c. electric field and very high frequency electric field (microwave). The object of the present work is to study some of the salient features of discharge phenomena initiated by r.f. electric field and the study includes the following aspects.

- (a) Dielectric breakdown by r.f. electric field of attaching and nonattaching gases at high pressure (a few mm. Hg.) and low pressure (micron Hg.) and the effect of ⁿbreakdown property of external d.c. magnetic field when applied transverse to r.f. field.
- (b) Effect of superimposed low and high external d.c. electric field on the r.f. breakdown property of gases when external d.c. and r.f. fields are parallel.
- (c) Breakdown of gases at very low pressure (1.5μ Hg.) by r.f. field and the effects of external d.c. magnetic field when applied transverse to r.f. electric field.
- (d) Effect of d.c. magnetic field on the optical radiation property of a discharge column excited by r.f. electric field, when the magnetic field is applied perpendicular to the column.