Fig. 1. Relation of oxygen consumption to survival after exposure to 600 r.

The results of these experiments follow my previous work concerning oxygen consumption of animals during irradiation^{3,4}, in which I demonstrated that raised oxygen consumption of rats during irradiation is dependent on the peripheral nerve tracts passing through the spinal cord being intact⁵.

It is obvious that a rise in the oxygen consumption during exposure to X-rays is an indication of the reactivity of the irradiated animal. Since the oxygen consumption of rats immediately after being placed in the chamber is not effected in the same way for all animals⁶, the absolute values for oxygen consumption obtained are, under given conditions, determined to a considerable extent by the way in which the individual animals react to the X-rays.

Consequently, it would seem that the relation between oxygen consumption by rats during exposure

Fig. 2. Oxygen consumption during exposure to 700 r. and its relation to survival

to X-rays and their survival is dependent above all on the state of reactivity of the animals during irradiation.

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Radiation Protection with Sulphur and Some Sulphur-containing Compounds

It is known that many biological systems can be protected in part against the effect of ionizing radiation by the presence of very small amounts of additives. It is often difficult to assess the mechanism of this protection due to the complex nature of the system. The effect of radiation on simple organic polymers can also be reduced by various additives. It is believed that this offers many analogies with protection in the more complex biological systems.

The present investigations involve the use of both non-aqueous and aqueous polymer systems; the former being by polydimethyl siloxane fluids and the latter dilute aqueous solutions of polyvinylpyrrolidone. We examined the effect of a wide variety of additives on the behaviour in these systems when exposed to γ -radiation.

The purpose of this communication is to report the high efficiency shown by colloidal sulphur suspensions in very low concentrations (in the range of 5–50 $\mu\text{gm./c.c.}$) in inhibiting the cross-linking of the investigated systems. This was readily shown by an increase (by a factor of 2 or 3) in the dose to bring about gelation. For the aqueous solutions, for example, this dose was increased from 2 to 6 megarads. This degree of protection is even more remarkable when it is remembered that the sulphur was present in the form of relatively large colloidal particles and not as molecules dispersed at random. A high efficiency in protection by sulphur in aqueous protein solutions was previously reported^{1,2}.

A similar effect of protection was shown by many sulphur-containing compounds which were used in the dilute aqueous polyvinylpyrrolidone solutions. It is not yet established whether the protection by these compounds is offered by an initial release of sulphur or by an alternative route.

The ability of sulphur to protect macromolecules against cross-linking under irradiation was found to be too large to agree with previously proposed mechanisms involving radical scavenging. This mechanism is, however, present with certain other additives. Further details of this work will be published shortly.

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