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SUNLAMPS, THERAPEUTIC LAMPS; ULTRAVIOLET AND INFRARED LAMPS.

Tests performed by the National Bureau of Standards of devices used for irradiating the human body, consist of investigations of the physical characteristics of the radiation emitted by such sources. Measurements are made of the total energy radiated, of the amounts of radiation within the wavelength bands considered to be biologically effective, and of the distribution of energy throughout the spectrum.

The National Bureau of Standards does not give information regarding the therapeutic value of exposure to radiation, nor does it advise prospective purchasers as to the benefits to be expected from the use of sunlamps, health lamps, or similar devices. The regulations of the Bureau do not permit endorsement or recommendation of devices offered for sale to the public, and comparative ratings of the products of different manufacturers cannot be given. References to recognized biological and medical authorities will be supplied when known.

Ultraviolet sources for irradiating the body are generally some form of carbon or mercury arc. The carbon arc is an inexpensive source but has generally been superseded by the mercury arc. The latter is a little easier to operate and requires less frequent renewal of the source unit. A tungsten-filament lamp operated at a high temperature emits some ultraviolet radiation but relatively little in the biologically effective region. Mercury sources are of two general types. The high-pressure, high-temperature, low-voltage type, gives relatively high emission in the near ultraviolet, visible and near infrared regions. There is considerable intensity of emission at and in the region of 2967 angstroms, the wavelength of maximum erythemal effectiveness. The low-pressure, low-temperature, high-voltage source, sometimes called the "cold quartz" lamp, has a low visible and infrared emission, and the ultraviolet radiation is largely concentrated in the spectral line at 2537 angstroms. The lamp envelope must be of quartz or special glass in order to transmit this short wavelength radiation. Nearly all sunlamps or therapeutic lamps are of the high-pressure type. In some instances the construction requires the addition of an incandescent filament for starting and regulation. A sunlamp is so named because the radiation, at a reasonable operating distance from the source, should be comparable in biologic effectiveness and in spectral distribution, in the wavelength range between 2900 and 3132 angstroms, with the ultraviolet emission of natural sunlight. This is accomplished by using an envelope of filter glass that cuts off all radiation of wavelengths shorter than about 2800 angstroms. No artificial source has a distribution closely resembling that of sunlight except for a limited interval of wavelengths. In all sources visible and infrared radiation is always emitted along with ultraviolet. A source emitting pure ultraviolet is a physical impossibility. Comparative

data and spectral energy curves, of the radiation emitted by the carbon and mercury arc lamps and by the sun, are given in BS Scientific Paper No. 539, now out of print but available for consultation in regional governmental depository libraries, also in BS Journal of Research, RP No. 450, obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. at a cost of 5 cents prepaid, money order or cash. Data on Sources of Ultraviolet and Infrared Radiation Used in Therapy -- Physical Characteristics -- are given in the Journal of the American Medical Association, Vol. 103, pp. 183 to 188, and 254 to 257, July 21 and 28, 1934.

Sunlamps are designed to be safe for use by inexperienced persons but to give adequate exposure in a reasonable time. Professional model lamps, used by physicians or under their direction, are similar in principle but larger, more elaborate, and capable of generating many times the amount of ultraviolet radiation obtainable from a sunlamp. These lamps generally emit radiation of shorter wavelengths than 2800 angstroms and in many instances the source unit is of fused quartz, relatively transparent to the entire ultraviolet spectrum. The type of holder or reflector used with a lamp is relatively unimportant. Users of ultraviolet lamps should exercise great caution in their use to avoid injury from burns from ultraviolet rays and from the housing of the lamp. For protecting the eyes, goggles fitting the face closely should be worn. Freedom from fire hazards should also be noted. To avoid danger from the rather infrequent accident of glass breakage due to the effects of heat, it is recommended that a lamp in a glass bulb should not be placed directly above a person in a prone position unless a coarse-mesh screen is interposed. Users should be warned of the danger of falling asleep while exposed to a lamp in operation. Overexposure may cause severe burns.

Specifications of minimum intensity of ultraviolet radiation, useful for therapeutic purposes, emitted by various types of lamps, are given in the Journal of the American Medical Association, vol. 114, pp. 325 and 326 (January) 1940.

Regulations to govern advertising of ultraviolet generators to the public only, are published in the J. American Medical Association, vol. 98, pp. 400 and 401; January 30, 1932. Similar regulations, to the medical profession: J. American Medical Association, vol. 102, pp. 841 and 842; March 17, 1934. For information on therapeutic questions, address the Council on Physical Therapy, American Medical Association, 535 North Dearborn Street, Chicago, Illinois.

Infrared lamps offered for sale to the public are generally in the form of 250-watt reflector-type bulbs, operable from ordinary lamp fixtures. The peak of the energy distribution curve from such a source is near 1 micron, in the region of wavelengths of maximum penetrating power for body tissues. The cone-shaped spiral coiled elements used in radiant heaters are also satisfactory infrared sources. Actually any warm, hot, or incandescent object emits infrared radiation. Its use is to be regarded as a means of application of heat and need not require expensive equipment. The usual precautions, as to avoidance of burns, fire hazard, and electrical shock, observable with all household appliances should be taken with infrared lamps.