[CONTRIBUTION FROM THE CHEMICAL LABORATORIES OF THE NORTH DAKOTA AGRICULTURAL COLLEGE]

MODIFIED KETENE LAMP

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Various generators for the production of ketene by the pyrolysis of acetone have been described (1, 2, 3, 4, 5, 6). The present piece of apparatus contains several novel features, not found in other ketene lamps, and is sufficiently different to justify description. Two differences in particular are worthy of note. This generator can be constructed in a short time from relatively simple materials without an advanced knowledge of glass blowing. A second advantage is the sudden cooling of the gaseous products of pyrolysis, a feature lacking in many of the other generators. This greatly increases the efficiency in terms of ketene to acetone ratio. The total capacity of the generator, moles of ketene per hour, is limited only by the size, and can be varied to meet individual needs.

DESCRIPTION OF APPARATUS

A 500-ml. three-neck flask A with standard taper interchangeable ground joints is used as a container for vaporizing the acetone by heating on a steam-bath or regulated electric heater B. The acetone vapors pass up through the tube C, constructed of a one-inch Pyrex tube, and over the filament D. This filament is made of 60 cm. of B and S No. 28 gauge Chromel-A resistance wire. This wire was previously wound on a 4 mm. glass rod, and then stretched and spiraled as shown. The two ends were securely spliced by winding to the platinum leads E, and these in turn were sealed through a standard taper interchangeable ground joint as shown at F.

The filament is heated by a Thordson 2D toy or Variac transformer. A potential from 20 to 22 volts is usually sufficient to keep the filament at a bright red heat under working conditions.

The hot gases from the filament D are immediately cooled by the "cold finger" condenser G and then further cooled by the condenser H. The condensed acetone is returned to the acetone boiler A through the trap I. The pyrolysis products, (ketene, methane, carbon monoxide, and ethylene) are then passed into the absorption flask J, as previously described (7). The entire piece of equipment is sealed together as one continuous unit except where it is attached to the three-neck flask A, also to the absorption flask J and where the heating element is introduced at F. These three connections should preferably be made of ground glass joints, although corks impregnated with water-glass may be used for A and F, and a short length of heavy walled rubber tubing to connect to the absorption flask J. The funnel K facilitates the addition of acetone. An ebulator tube L aids in keeping the acetone boiling smoothly.

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The apparatus delivered 0.068 mole of ketene per hour as determined by passing the effluent gas into a solution of aniline in acetone and weighing the acetanilide formed.

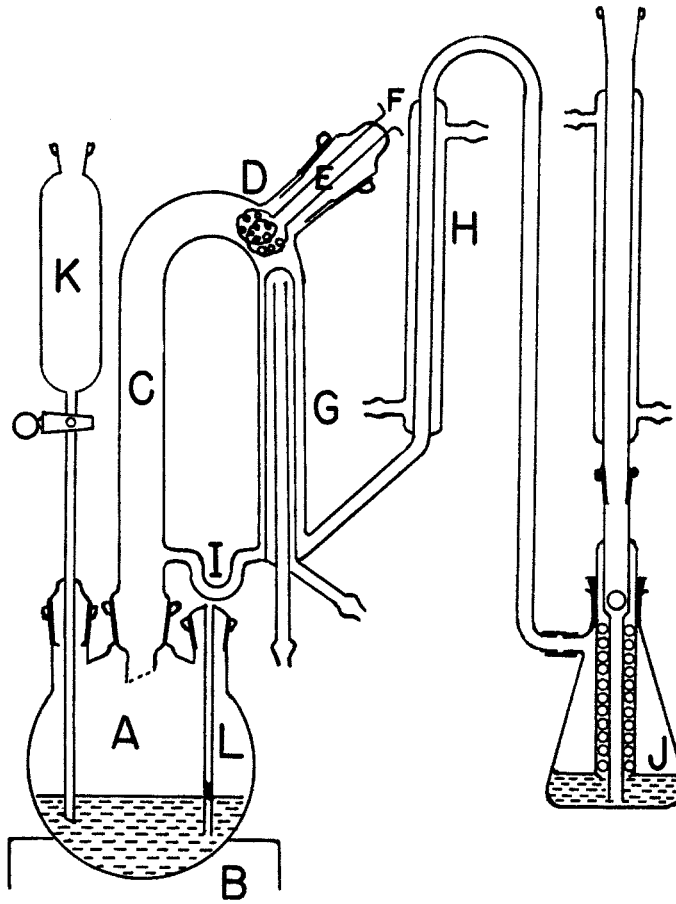

FIG. 1. MODIFIED KETENE LAMP

SUMMARY

A modified ketene lamp, that can be readily constructed from available materials, is described. The efficiency is high, and capacity may be varied with size.

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