

UNITED STATES PATENT OFFICE.

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CATALYTIC OXIDATION OF ANTHRACENE.

1,355,098.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that we, (1) JOHN M. WEISS and (2) CHARLES R. DOWNS, citizens of the United States, residing at (1) 210 West 110th street and (2) Cliffside, in the counties (1) New York and (2) Bergen and States of (1) New York and (2) New Jersey, have invented certain new and useful Improvements in Catalytic Oxidation of Anthracene, of which the following is a specification.

This invention relates to the catalytic oxidation of anthracene. It comprises the partial oxidation of anthracene by oxygen, either alone or mixed with diluents, in the presence of a catalyzer to form anthraquinone.

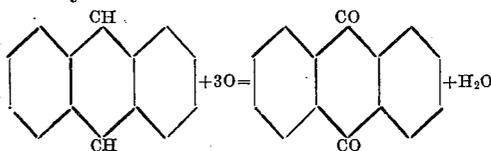
The invention may be practised by subjecting anthracene in the vapor stage, mixed with air or other diluent gases, to a suitable temperature in the presence of an oxid of vanadium, or other compound of vanadium. By suitably regulating the conditions, such as temperature, pressure, and presence of diluents, and operating with the proper catalyzer, the degree of oxidation can be controlled whereby the anthracene is oxidized to an extent short of what is commonly known as complete combustion, to produce anthraquinone.

The invention will be explained in connection with the following example which is given for illustrative purposes. It is not intended to limit the procedure to the exact details given as the process can be varied throughout wide limits without departing from the spirit and scope of the invention.

A mixture of anthracene and air in the vapor form is passed through tubes heated to about 300° C. to 500° C., the tubes containing vanadium oxid deposited on crushed pumice, with the result that anthraquinone is produced. Instead of introducing oxygen as oxygen of the air, oxygen gas may be used either alone or diluted with nitrogen or other inert gas; the temperature may be varied between about 300° C. and 500° C.; the catalyzer may be deposited on crushed pumice or other suitably powdered, granulated or fibrous material which is chemically inactive and acts merely as a mechanical distributor; the rate at which the vapor is passed through may be regulated to suit the needs; the tubes may be varied in length or diameter, or confined spaces other than

tubes may be used in which to place the catalyzer; instead of vanadium oxid, other compounds of vanadium may be used as the catalyzer. It is essential that hot anthracene in the vapor stage shall come in contact with the catalyzer in the presence of oxygen for the proper oxidation to take place. The introduction of a diluent gas is a convenient way to regulate the reaction. It has been found that the pressure may be varied throughout quite wide ranges, say from slightly below atmospheric up to two atmospheres or more with satisfactory results.

The following equation is suggested as representing the reaction which takes place, though it is not desired to limit the operation to any particular theory. The equation is given to explain the reaction as indicated by the results obtained.



Anthraquinone is apparently an intermediate product of the incomplete oxidation of anthracene. In the operation of this process there has been found to be very little complete combustion thus indicating that practically all of the anthracene which is oxidized is changed to anthraquinone. Any of the anthracene which passes through the process unchanged may, of course, be passed through again mixed with a fresh supply of anthracene and oxygen, if desired, when more of it will be oxidized.

Claims:

1. The method of oxidizing anthracene which comprises subjecting anthracene in the vapor phase to oxidation by oxygen in the presence of an oxid of vanadium as a catalyzer at a temperature of about 300° C. to 500° C.

2. The method of oxidizing anthracene which comprises passing a mixture of anthracene in the vapor phase, and an oxygen containing gas, into contact with an oxid of vanadium as a catalyzer heated to a temperature of about 300° C. to 500° C. where anthraquinone is produced.

In testimony whereof we affix our signatures.

JOHN M. WEISS.
CHARLES R. DOWNS.