leads to thermal stresses in the reaction tube, which may cause fracture of the reaction tube during operation.

For this reason, there still exists a need for reaction tubes for the preparation of hydrogen cyanide with which an improved space-time yield and a higher yield of hydrogen cyanide can be achieved, in comparison to the cylindrical tubes used on an industrial scale, and which do not have the disadvantages of the reaction tubes with tubular or rod-shaped internals known from DE 1 078 554 and WO 2006/050781.

It has now been found that this object can be achieved by inserts composed of ceramic which are inserted into the reaction tube, which have fins pointing from the tube axis to the inner wall of the tube.

The invention therefore provides a reaction tube for preparing hydrogen cyanide comprising a cylindrical tube composed of ceramic, and a catalyst comprising platinum applied to the inner wall of the tube, characterized in that the tube has at least one insert composed of ceramic, having three or four fins pointing from the tube axis to the inner wall of the tube, which is inserted into the cylindrical tube, wherein the fins divide the tube interior space into substantially straight channels with substantially identical circle segment cross sections and wherein the mean ~~gap~~ distance between the ends of the fins and the inner wall of the tube is in the range of 0.1 to 3 mm.

The invention also relates to a method for preparing hydrogen cyanide by reacting ammonia and at least one aliphatic hydrocarbon having 1 to 4 carbon atoms in the presence of a catalyst comprising platinum at a temperature of 1000 to 1400°C, characterized in that the reaction is carried out in a reaction tube according to the invention.

pressure equalization between neighbouring channels. The fins of the insert may be positioned on a rod or tube extending along the axis of the tube. However, the fins of the insert preferably extend as far as the tube axis and meet one another at the tube axis. The mean ~~gap~~ distance between the ends of the fins and the inner wall of the tube is in the range of 0.1 to 3 mm. The ends of the fins are preferably rounded. The mean ~~gap~~ distance then relates to that point at which the rounding of the fin comes closest to the inner wall of the tube.

The insert of the reaction tube according to the invention may be produced in the same manner as the cylindrical tube by extruding a plastic material comprising aluminium oxide and subsequent drying and calcination.

The insert of the reaction tube according to the invention has the advantage that it is not so greatly deformed on heating to the temperature required for preparing hydrogen cyanide by the BMA process, by reason of its geometry, as the tubular or rod-shaped internals known from the prior art. Also, by reason of its geometry and the small ~~gap~~ distance between the ends of the fins and the inner wall of the tube, it is less likely to undergo vibrations or gyratory motions induced by gas flowing through the reaction tube than the rod-shaped or tubular internals known from the prior art. This ensures that abrasion of catalyst from the inner wall of the tube does not occur when using the reaction tube for preparing hydrogen cyanide by the BMA process. Abrasion of the catalyst from the inner wall of the tube can also be avoided by rounded ends of the fins. The geometry of the insert and the small ~~gap~~ distance between the ends of the fins and the inner wall of the tube also ensures that the channels formed between the fins maintain the same cross section while using the reaction tube for preparing hydrogen cyanide, such that the flow distribution remains uniform in the channels and thermal stresses due to

can be maintained over a longer period of operation in contrast to the rod-shaped or tubular internals known from the prior art.

Fig. 1 to 3 show embodiments of the insert and arrangement thereof in the cylindrical tube of the reaction tube according to the invention.

Fig. 1 shows an insert composed of ceramic with four fins in perspective view.

Fig. 2 shows a cross section through a reaction tube with an insert composed of ceramic having four fins, pointing from the tube axis towards the inner wall of the tube and which are rounded at the ends.

Fig. 3 shows a cross section through a reaction tube with an insert composed of ceramic having three fins, pointing from the tube axis towards the inner wall of the tube and which are rounded at the ends.

The insert shown in Fig. 1 may be inserted into the cylindrical tube to provide a cross section as shown in Fig. 2 along the entire length of the insert, i.e. the ~~gap~~ distance between the ends of the fins and the inner wall of the tube is the same along the entire length of the insert. On the other hand, the insert shown in Fig. 1 may be inserted into the cylindrical tube to provide a cross section as shown in Fig. 2 only at the middle of the insert, whereas at the ends the insert makes contact with the inner wall of the tube through one or two of the fins, as long as the mean ~~gap~~ distance between the ends of the fins and the inner wall of the tube is in the range of 0.1 to 3 mm. For example, this is the case if the cross section corresponds to Fig. 2 at the middle of the insert with a ~~gap~~ distance between the fins and the inner wall of the tube of 1 mm, whereas at the upper end of the insert the fins shown in Fig. 2 on the top and left side make contact with the inner wall of the tube and at

rounded fins corresponding to Fig. 1, was inserted into the cylindrical tube. The insert had a length of 1200 mm, a mean wall thickness of the fins of 2.8 mm and a mean ~~gap~~ distance between the ends of the fins and the inner wall of the tube of 0.5 mm. The yield of hydrogen cyanide was 88.7% based on ammonia and 98.1% based on methane.

Example 4

Example 3 was repeated, however an insert having a length of 1800 mm was used. The yield of hydrogen cyanide was 90.8% based on ammonia and 99.6% based on methane.

Example 5

Example 3 was repeated, however an insert having a length of 600 mm was used. The yield of hydrogen cyanide was 81.9% based on ammonia and 92.6% based on methane.

The examples show that higher yields of hydrogen cyanide with respect to hydrocarbon used and with respect to ammonia used and also a higher space-time yield are achieved with the reaction tube according to the invention in preparing hydrogen cyanide by the BMA process than by using a reaction tube without internals. Better yields are also achieved with the same length of insert than by using a reaction tube with rod-shaped or tubular internals corresponding to the prior art.

Claims

1. A reaction tube for preparing hydrogen cyanide comprising a cylindrical tube composed of ceramic and a catalyst comprising platinum applied to the inner wall of the tube,
characterized in that
said tube has at least one insert composed of ceramic, having three or four fins pointing from the tube axis to the inner wall of the tube, which is inserted into the cylindrical tube, wherein the fins divide the tube interior space into substantially straight channels with substantially identical circle segment cross sections and wherein the mean ~~gap~~ distance between the ends of the fins and the inner wall of the tube is in the range of 0.1 to 3 mm.

2. The reaction tube as claimed in claim 1,
characterized in that
the cylindrical tube is composed of tightly sintered aluminium oxide.

3. The reaction tube as claimed in claim 1 or 2,
characterized in that
the insert is composed of sintered aluminium oxide.

4. The reaction tube as claimed in any one of claims 1 to 3,
characterized in that
the insert is coated with a catalyst comprising platinum.

5. The reaction tube as claimed in any one of claims 1 to 4,
characterized in that
the ends of the fins are rounded.