[0010]

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[SUMMARY]

[0010a]

In one aspect of the present disclosure, there is provided a cleaning flux characterized in that the cleaning flux contains, as the solvent, 60-98% by weight of one or both of an alkylene oxide-resorcinol copolymer and an ethylene oxide-propylene oxide condensation-added alkylene diamine wherein an addition amount of the alkylene oxide-resorcinol copolymer is within a range of 0-98% by weight and the addition amount of the ethylene oxide-propylene oxide condensation-added alkylene diamine is within the range of 0-98% by weight; and the cleaning flux further contains one or both of an organic acid and a halogen compound wherein the addition amount of the organic acid is within the range of 0-18% by weight and the addition amount of the halogen compound is within the range of 0-4% by weight.

[0010b]

In another aspect of the present disclosure, there is provided a cleaning solder paste in which a cleaning flux and solder alloy powder are mixed, characterized in that the cleaning flux contains, as the solvent, 60-93% by weight of one or both of an alkylene oxide-resorcinol copolymer and an ethylene oxide-propylene oxide condensation-added alkylene diamine wherein an addition amount of the alkylene oxide-resorcinol copolymer is 0-93% by weight and the addition amount of the ethylene oxide-propylene oxide condensation-added alkylene diamine is within the range of 0-93% by weight; and the cleaning flux further contains one or both of an organic acid and a halogen compound wherein the addition amount of the organic acid is within the range of 0-18% by weight and the addition amount of the halogen compound is within the range of 0-4% by weight.

[PROBLEMS TO BE SOLVED BY THE INVENTION]

[0011]

In the past, in flux, the solvent is a main component that volatilizes in the soldering process and adheres in the reflow furnace. In the past, it has not been proposed to form the flux by focusing on the suppression of the solvent volatilization and the suppression of the whole flux volatilization.

[0012]

The present invention solves these problems and has an object to provide a cleaning flux that does not inhibit a function for removing a metal oxide film but can suppress volatilization by heating during soldering and clean a residue; a cleaning solder paste in which the cleaning flux and solder alloy powder are mixed; and a solder joint that is formed by using the cleaning flux or the cleaning solder paste.

[MEANS FOR SOLVING THE PROBLEMS]

[0013]

As described hereinbefore, the solvent is the main component that volatilizes in the soldering process and adheres in the reflow furnace. On the other hand, since a component added as an activator to the flux also volatilizes during the soldering process, it is one of elements of stain in the reflow furnace. However, reducing an addition amount of the activator causes a capability of removing the metal oxide film to be reduced.

[0014]

Accordingly, the inventors of the present application have found that, by using a compound having the functions of the solvent and the activator and having the capability of cleaning the residue generated by suppressing the volatilization, the stain in the reflow furnace can be reduced while

copolymer is within the range of 0-93% by weight and the addition amount of the ethylene oxide-propylene oxide condensation-added alkylene diamine is within the range of 0-93% by weight. In a case of containing both of the alkylene oxide-resorcinol copolymer and the ethylene oxide-propylene oxide condensation-added alkylene diamine, the total addition amount of the alkylene oxide-resorcinol copolymer and the ethylene oxide-propylene oxide condensation-added alkylene diamine is 60-93% by weight.

[0042]

In a case of containing either the alkylene oxide-resorcinol copolymer or the ethylene oxide-propylene oxide condensation-added alkylene diamine, the addition amount of the alkylene oxide-resorcinol copolymer or the ethylene oxide-propylene oxide condensation-added alkylene diamine is 60-93% by weight.

[0043]

Moreover, one or both of the organic acid and the halogen composition are contained wherein the addition amount of the organic acid is within the range of 0-18% by weight and the addition amount of the halogen composition is within the range of 0-4% by weight. The addition amount of the rosin is 0-15% by weight and the addition amount of the thixotropic agent is 5-30% by weight as needed basis. The cleaning solder paste of this example is formed by mixing, in proportion, 80-91% by weight of solder alloy powder having the solder alloy composition of Sn-3Ag-0.5Cu (each number shows % by weight) and 9-20% by weight of the cleaning flux. The present invention is not limited only to this solder alloy.

[0044]

The solder joint of the embodiment is formed by soldering by a use of the aforementioned cleaning flux and the solder alloy having a desired composition or a use of the aforementioned cleaning solder paste.

[EXECUTED EXAMPLES]

[0045]

The flux of each of the executed examples and the comparison examples having compositions shown in the following table 1 was prepared. The volatilization and soldering property of the flux were

[0051]

As shown in Table 1, all of the executed example 1 (EE1) and the executed example 2 (EE2), which contained the alkylene oxide-resorcinol copolymer, the ethylene oxide-propylene oxide condensation-added alkylene diamine and the activator. The executed examples 3-8 (EE3-8), which further contained the thixotropic agent, found the volatilization rate of 20% or less, so that it has been found that they meet the desired low volatilization. Moreover, it was found that the spreading diameter thereof was 80% or more and they met the desired soldering property.

[0052]

On the other hand, in each comparison example to which a conventional volatile solvent component such as diethylene glycol monohexyl ether or the like was added, it has been found that they meet the soldering property but the volatilization volume thereof is larger than 30% and they do not meet the desired low volatilization.

[0053]

From the executed examples 3-5, it has been found that one or both of the organic acid and the halogen agent may be used. From the executed examples 6 and 7, it has been found that only one of the alkylene oxide-resorcinol copolymer and the ethylene oxide-propylene oxide condensation-added alkylene diamine may be used.

[0054]

From the executed example 8, it has been found that the rosin may be used. However, if the rosin is added to the flux, the viscosity shows a tendency to increase. Therefore, it is preferable that the addition amount of the rosin is equal to or less than 15% by weight.

[0055]

From the above verification result, it has been found that the flux volatilization based on the heating during the soldering can be suppressed by adding one or both of the alkylene oxide-resorcinol copolymer and the ethylene oxide-propylene oxide condensation-added alkylene diamine instead of the conventional solvent component. Moreover, it has been found that the soldering property does not reduce and the soldering property substantial same as the conventional one can be obtained by adding one or both of the alkylene oxide-resorcinol copolymer and the ethylene oxide-propylene oxide condensation-added alkylene diamine.

## CLAIMS

1. A cleaning flux characterized in that the cleaning flux contains, as the solvent, 60-98% by weight of one or both of an alkylene oxide-resorcinol copolymer and an ethylene oxide-propylene oxide condensation-added alkylene diamine wherein an addition amount of the alkylene oxide-resorcinol copolymer is within a range of 0-98% by weight and the addition amount of the ethylene oxide-propylene oxide condensation-added alkylene diamine is within the range of 0-98% by weight; and the cleaning flux further contains one or both of an organic acid and a halogen compound wherein the addition amount of the organic acid is within the range of 0-18% by weight and the addition amount of the halogen compound is within the range of 0-4% by weight.

2. The cleaning flux according to Claim 1 characterized in that the cleaning flux further contains 0-30 % by weight of a thixotropic agent and 0-15% by weight of rosin.

3. A cleaning solder paste in which a cleaning flux and solder alloy powder are mixed, characterized in that the cleaning flux contains, as the solvent, 60-93% by weight of one or both of an alkylene oxide-resorcinol copolymer and an ethylene oxide-propylene oxide condensation-added alkylene diamine wherein an addition amount of the alkylene oxide-resorcinol copolymer is 0-93% by weight and the addition amount of the ethylene oxide-propylene oxide condensation-added alkylene diamine is within the range of 0-93% by weight; and the cleaning flux further contains one or both of an organic acid and a halogen compound

wherein the addition amount of the organic acid is within the range of 0-18% by weight and the addition amount of the halogen compound is within the range of 0-4% by weight.

4. The cleaning solder paste according to Claim 3 characterized in that the cleaning flux further contains 5-30% by weight of a thixotropic agent and 0-15% by weight of rosin.