Claims

1. A process for oligomerization of C_3- to C_6-olefins, the process comprising:

reacting a C_3- to C_6-olefin in at least one reaction stage, which comprises in each case at least one reactor and at least one distillation column,

wherein the oligomerization is catalysed with an oligomerization catalyst,

wherein the oligomerization catalyst, before being charged to the reaction stage, in storage, transport, and/or in charging to the reaction stage, is kept in a dry atmosphere at less than 65% relative humidity, and

wherein the oligomerization catalyst has a composition of:

15 to 40% by weight of NiO,

5 to 30% by weight of Al_2O_3,

55 to 80% by weight of SiO_2,and

0.01 to 2.5% by weight of an alkali metal oxide.

2. The process according to claim 1, wherein the oligomerization catalyst in storage, transport and/or charging to the reaction stage, is kept in a dry atmosphere at less than 60% relative humidity.

3. The process according to claim 1, wherein the oligomerization catalyst in storage, transport and/or charging to the reaction stage, is kept in a dry atmosphere at less than 50% relative humidity.

4. The process according to claim 1, wherein the oligomerization catalyst, before being charged to the reaction stage in storage, transport and/or in charging to the reaction stage, is kept in a dry atmosphere where humidity is lower by at least 3% than the humidity of the surroundings.

5. The process for the oligomerization according to claim 1, further comprising a second reaction stage, wherein the oligomerization catalyst in the second reaction stage is selected from heterogeneous transition-metal-containing oligomerization catalysts, wherein the transition metal is selected from the group consisting of nickel, cobalt, chromium, titanium and tantalum.

6. The process according to claim 5, wherein the oligomerization catalyst of the second reaction stage comprises or consists of a nickel compound on an aluminosilicate support material.

7. The process according to claim 6, wherein both of the oligomerization catalysts have a composition of:
15 to 40% by weight of NiO,
5 to 30% by weight of Al_2O_3,
55 to 80% by weight of SiO_2, and
0.01 to 2.5% by weight of an alkali metal oxide.

8. The process according to claim 1, wherein the process comprises two, three, four or five reaction stages.

9. The process according to claim 1, wherein the oligomerization catalyst used for charging is a newly produced oligomerization catalyst or a regenerated oligomerization catalyst.

10. The process according to claim 9, wherein the oligomerization catalyst used for charging is the regenerated oligomerization catalyst, and wherein the regenerated oligomerization catalyst is produced by:
A) burning off an oligomerization catalyst used for the oligomerization, and
B) impregnating the oligomerization catalyst burnt off in A) with a solution of a transition metal compound and subsequent calcining.

11. The process according to claim 1, wherein the oligomerization is carried out at a temperature in the range of 50 to 200°C and at a pressure of 10 to 70 bar.

12. A process for replacement of an oligomerization catalyst with a fresh oligomerization catalyst in a reaction stage, the process comprising:
keeping the fresh oligomerization catalyst in a dry atmosphere at less than 65% relative humidity, before replacement in storage, transport and/or during replacement on charging to a reaction stage,
wherein the fresh oligomerization catalyst has a composition of:
15 to 40% by weight of NiO,
5 to 30% by weight of Al_2O_3,
55 to 80% by weight of SiO_2, and
0.01 to 2.5% by weight of an alkali metal oxide.

13. The process according to claim 1, further comprising producing an aldehyde, alcohol, or carboxylic acid from the oligomers produced in claim 1.

14. The process according to claim 12, wherein before the replacement in storage, transport and/or during the replacement on charging to the reaction stage, the fresh oligomerization catalyst used for the replacement is kept in a dry atmosphere at less than 60% relative humidity.

15. The process according to claim 12, wherein before the replacement in storage, transport and/or during the replacement on charging to the reaction stage, the fresh oligomerization catalyst used for the replacement is kept in a dry atmosphere where humidity is lower by at least 3% than the humidity of the surroundings.

16. An oligomerization system for C_3- to C_6-olefins, the system comprising:

at least one reaction stage, wherein the at least one reaction stage comprises at least one reaction and at least one distillation column,

an oligomerization catalyst, wherein the oligomerization catalyst, before being charged to the at least one reaction stage in storage, transport, and/or in charging to the at least one reaction stage, is kept in a dry atmosphere at less than 65% relative humidity, and

a fresh oligomerization catalyst kept in a dry atmosphere at less than 65% relative humidity, wherein the oligomerization catalyst has a composition of:

15 to 40% by weight of NiO,

5 to 30% by weight of Al_2O_3,

55 to 80% by weight of SiO_2,and

0.01 to 2.5% by weight of an alkali metal oxide.