Claims

1. An interlock for use in a process for production of a polymer in a reactor, which interlock is an instrumented system which is designed to act in response to a condition within the process which indicates a potentially dangerous situation or consequence, and to thereby prevent or mitigate said situation or consequence, and which process comprises:

a. polymerising a monomer and optionally a comonomer in the reactor to produce polymer, optionally in the presence of an inert hydrocarbon, and

b. withdrawing produced polymer from the reactor,

said interlock being based on the temperature in the reactor, and comprising:

1. measuring the temperature in the reactor or a temperature representative of the temperature in the reactor, and

2. comparing said measured temperature to a threshold temperature, which threshold temperature is below the normal range of temperature in the reactor expected for the production of the relevant polymer,

said interlock being characterised in that withdrawal is allowed if the measured temperature is greater than the threshold temperature but is prevented if the measured temperature is lower than the threshold temperature.

2. An interlock for use in a process for production of a polymer in a reactor, which interlock is an instrumented system which is designed to act in response to a condition within the process which indicates a potentially dangerous situation or consequence, and

to thereby prevent or mitigate said situation or consequence, and which process comprises:

a. polymerising a monomer and optionally a comonomer in the reactor to produce polymer, optionally in the presence of an inert hydrocarbon, and

b. withdrawing produced polymer from the reactor,

said interlock being based on the pressure and the temperature in the reactor, and comprising:

1. measuring the pressure in the reactor or a pressure representative of the pressure in the reactor

2. measuring the temperature in the reactor or a temperature representative of the temperature in the reactor,

3. comparing said measured pressure to a threshold pressure, which threshold pressure is below the typical operating pressure of the process,

4. comparing said measured temperature to a threshold temperature, which threshold temperature is below the normal range of temperature in the reactor expected for the production of the relevant polymer,

said interlock being characterised in that withdrawal is allowed if either:

1. the measured pressure in the reactor is less than the threshold pressure, or

2. the measured pressure in the reactor is greater than the threshold pressure and the measured temperature is greater than the threshold temperature,

but is prevented if the measured pressure in the reactor is greater than the threshold pressure but the measured temperature is lower than the threshold temperature.

3. An interlock according to claim 2 wherein the threshold pressure is between 500 and 1500 kPa.

4. An interlock according to any one of the preceding claims wherein the threshold temperature is variable and is based on the total partial pressure in the reactor of hydrocarbons.

5. An interlock according to any one of the preceding claims wherein the polymerisation reaction of step (a) is a gas phase process, for example a fluidised bed or stirred bed gas phase polymerisation process.

6. An interlock according to claim 5, wherein the process comprises:

a. polymerising a monomer and optionally a comonomer in the reactor in the gas phase to produce polymer, in the presence of one or more inert hydrocarbons having 5 or more carbon atoms, and

b. withdrawing produced polymer from the reactor,

and characterised in that the threshold temperature is dependent on the partial pressure in the reactor of inert hydrocarbons having 5 or more carbon atoms.

7. An interlock according to claim 6 wherein the threshold temperature varies according to the formula:

$$T_t = T_f + \Sigma^i A_i.PP_i \qquad (1)$$

wherein:

T_t is the threshold temperature,

T_f is a temperature constant,

i is at least 5 and is the number of carbon atoms in an inert hydrocarbon present in the reactor,

A_i is a positive constant (for inert hydrocarbons with i carbon atoms), and

PP_i is the partial pressure in the reactor of inert hydrocarbons having i carbon atoms.

8. An interlock according to claim 7 wherein T_f is in the range 70 to 80°C, and A_i's are in the range 0.5 to 2.5°C per 10kPa (5 to 25°/bar).

9. An interlock according to claim 8 wherein A_5 is in the range 0.5 to 1.0°C per 10kPa (5 to 10°/bar), A_6 is in the range 1.0 to 1.5°C per 10kPa (10 to 15°/bar) and A8 is in the range 1.5 to 2.0°C per 10kPa (15 to 20°/bar).

10. An interlock according to any one of the preceding claims wherein the polymerisation reaction of step (a) is a process for polymerisation of ethylene or propylene as monomer.

11. An interlock according to claim 10 wherein there is used a comonomer having 4 to 12 carbon atoms, for example 1-butene, 1-hexene or 1-octene.

12. A process for production of a polymer in a reactor, which process comprises:

a. polymerising a monomer and optionally a comonomer in the reactor to produce polymer, optionally in the presence of an inert hydrocarbon, and

b. withdrawing produced polymer from the reactor,

said process using an interlock according to any one of claims 1 to 11.

13. A process according to claim 12 wherein the process is a process for polymerisation of ethylene or propylene as monomer.

14. A process according to claim 12 or claim 13 wherein the process is a gas phase process, for example a fluidised bed or stirred bed gas phase polymerisation process.