What is claimed is:

1. A turbulent fluidized bed reactor for preparing para-xylene and co-producing light olefins from methanol and/or dimethyl ether and toluene, wherein the turbulent fluidized bed reactor comprises a reaction zone, a dilute phase zone, a first reactor feed distributor and a plurality of second reactor feed distributors, the first reactor feed distributor and the plurality of second reactor feed distributors are sequentially arranged from bottom to top in the reaction zone; wherein the reaction zone is located in a lower part of the turbulent fluidized bed reactor, and the dilute phase zone is located in an upper part of the turbulent fluidized bed reactor;

the feed to the first reactor feed distributor comprises toluene and a portion of methanol and/or dimethyl ether;

the feed to the second reactor feed distributor comprises methanol and/or dimethyl ether;

the number of the second reactor feed distributors is in a range from 2 to 10;

wherein the turbulent fluidized bed reactor comprises a perforated plate located between the first reactor feed distributor and at least one of the second reactor feed distributors, the porosity of the perforated plate is less than or equal to 50%;

the turbulent fluidized bed reactor comprises a first reactor gas-solid separator, the first reactor gas-solid separator is placed outside a reactor shell, the first reactor gas-solid separator is provided with a regenerated catalyst inlet, a regenerated catalyst outlet of the first reactor gas-solid separator is placed at the bottom of a reaction zone and between the first reactor feed distributor and the perforated plate, and a gas outlet of the first reactor gas-solid separator is placed in the dilute phase zone.

2. The turbulent fluidized bed reactor of claim 1, wherein the turbulent fluidized bed reactor further comprises a second reactor gas-solid separator, the second reactor gas-solid separator is placed in the dilute phase zone or outside the reactor shell;

an inlet of the second reactor gas-solid separator is placed in the dilute phase zone, a catalyst outlet of the second reactor gas-solid separator is placed in the reaction zone, and a gas outlet of the second reactor gas-solid separator is connected

to a product gas outlet of the turbulent fluidized bed reactor;

the first reactor gas-solid separator and the second reactor gas-solid separator are cyclone separators.

3. The turbulent fluidized bed reactor of claim 1 or 2, wherein the turbulent fluidized bed reactor comprises a reactor heat extractor, and the reactor heat extractor is arranged inside or outside the shell of the turbulent fluidized bed reactor.

4. The turbulent fluidized bed reactor of claim 3, wherein

the reactor heat extractor is arranged between the plurality of reactor feed distributors;

the turbulent fluidized bed reactor comprises a reactor stripper, the reactor stripper passes through the reactor shell from the outside to the inside at the bottom of the turbulent fluidized bed reactor and is opened in the reaction zone of the turbulent fluidized bed reactor, and a reactor stripping gas inlet and a spent catalyst outlet are arranged at the bottom of the reactor stripper.

5. The turbulent fluidized bed reactor of claim 4, wherein the perforated plate is located between the first reactor feed distributor and the second reactor feed distributor closest to the first reactor feed distributor, the porosity of the perforated plate is in a range from 5% to 50%;

the horizontal height of opening of the reactor stripper in the reactor shell is higher than that of the first reactor feed distributor and higher than that of the perforated plate.

6. A device for preparing para-xylene and co-producing light olefins from methanol and/or dimethyl ether and toluene, wherein the device comprises at least one of the turbulent fluidized bed reactor according to any one of claims 1 to 5 and a fluidized bed regenerator for regenerating a catalyst.

7. The device of claim 6, wherein the fluidized bed regenerator is a turbulent fluidized bed regenerator, and the fluidized bed regenerator comprises a regenerator shell, a regenerator gas-solid separator, a regenerator heat extractor and

the regenerator stripper; the lower part of the fluidized bed regenerator is a regeneration zone, the upper part of the fluidized bed regenerator is a dilute phase zone of the regenerator, the regenerator feed distributor is placed at the bottom of the regeneration zone, the regenerator heat extractor is placed in the regeneration zone, and the regenerator gas-solid separator is placed in the dilute phase zone or outside the regenerator shell;

the inlet of the regenerator gas-solid separator is placed in the dilute phase zone of the regenerator, the catalyst outlet of the regenerator gas-solid separator is placed in the regeneration zone, and the regenerator stripper is opened at the bottom of the regenerator shell.

8. The device of claim 6, wherein the fluidized bed regenerator comprises a regenerator shell, a regenerator feed distributor, a regenerator gas-solid separator, a regenerator heat extractor, a flue gas outlet and a regenerator stripper;

the lower part of the fluidized bed regenerator is a regeneration zone, and the upper part of the fluidized bed regenerator is a dilute phase zone;

the regenerator feed distributor is placed at the bottom of the regeneration zone, the regenerator heat extractor is placed in the regeneration zone, the regenerator gas-solid separator is placed in the dilute phase zone or outside the regenerator shell, the inlet of the regenerator gas-solid separator is placed in the dilute phase zone, the catalyst outlet of the regenerator gas-solid separator is placed in the regeneration zone, the gas outlet of the regenerator gas-solid separator is connected to the flue gas outlet, and the regenerator stripper is opened at the bottom of the regenerator shell;

the spent catalyst outlet of the reactor stripper is connected to the inlet of an inclined spent catalyst pipe, a spent catalyst sliding valve is arranged in the inclined spent catalyst pipe, the outlet of the inclined spent catalyst pipe is connected to the inlet of a spent catalyst lift pipe, the bottom of the spent catalyst lift pipe is provided with a spent catalyst lifting gas inlet, and the outlet of the spent catalyst lift pipe is connected to the dilute phase zone of the fluidized bed regenerator;

the bottom of the regenerator stripper is provided with a regenerator stripping gas inlet, the bottom of the regenerator stripper is connected to the inlet of an inclined regenerated catalyst pipe, a regenerated catalyst sliding valve is arranged in the inclined regenerated catalyst pipe, the outlet of the inclined regenerated catalyst

pipe is connected to the inlet of a regenerated catalyst lift pipe, the bottom of the regenerated catalyst lift pipe is provided with a regenerated catalyst lifting gas inlet, the outlet of the regenerated catalyst lift pipe is connected to the regenerated catalyst inlet of the first reactor gas-solid separator, and the first reactor gas-solid separator is placed outside the reactor shell of the fluidized bed reactor.

9. A method for preparing para-xylene and co-producing light olefins from methanol and/or dimethyl ether and toluene, wherein at least one of the turbulent fluidized bed reactors according to any one of claims 1 to 5 is used wherein a raw material A containing methanol and/or dimethyl ether and toluene is fed into the reaction zone of the turbulent fluidized bed reactor from the first reactor feed distributor to be in contact with the regenerated catalyst supplied from the regenerated catalyst outlet of the first reactor gas-solid separator and a raw material B containing methanol and/or dimethyl ether is respectively fed into the reaction zone of the turbulent fluidized bed reactor from a plurality of second reactor feed distributors respectively to be in contact with the catalyst, to form a material stream C containing para-xylene and light olefins products and a spent catalyst.

10. The method of claim 9, wherein the material stream C is separated to obtain para-xylene, light olefins, C_{5+} chain hydrocarbons, aromatic by-products and unconverted methanol, dimethyl ether and toluene;

wherein the unconverted methanol and dimethyl ether are fed into the reaction zone of the turbulent fluidized bed reactor from a plurality of second reactor feed distributors, the aromatic by-products and the unconverted toluene are fed into the reaction zone of the turbulent fluidized bed reactor from the first reactor feed distributor to be in contact with a catalyst.

11. The method of claim 9 or 10, wherein the spent catalyst is regenerated by a fluidized bed regenerator and fed to the bottom of the reaction zone of the turbulent fluidized bed reactor.

12. The method of claim 9, wherein the method comprises the steps of:

(1) feeding a material stream A containing methanol and/or dimethyl

ether and toluene into the reaction zone of the turbulent fluidized bed reactor from a first reactor feed distributor below the turbulent fluidized bed reactor to be in contact with the catalyst;

(2) feeding a material stream B containing methanol and/or dimethyl into the reaction zone of the turbulent fluidized bed reactor from 2 to 10 second reactor feed distributors to be in contact with the catalyst, to form a material stream C containing para-xylene and light olefins products and a spent catalyst; the 2 to 10 second reactor feed distributors are arranged in sequence above the first reactor feed distributor;

(3) separating the stream material C obtained from the step (2) to obtain a material stream C-1 containing unconverted methanol and dimethyl, a material stream C-2 containing aromatic by-products and unconverted toluene; the material stream C-1 is respectively fed into the reaction zone of the turbulent fluidized bed reactor from the 2 to 10 second reactor feed distributors to be in contact with the catalyst; the material stream C-2 is fed into the reaction zone of the turbulent fluidized bed reactor from the first reactor feed distributor to be in contact with the catalyst;

the aromatic by-products comprise benzene, o-xylene, m-xylene, ethylbenzene and C_{9+} aromatics;

(4) regenerating the spent catalyst obtained from the step (2) by the fluidized bed regenerator, the regenerated catalyst is fed to the first reactor gas-solid separator to removal the gas, and then the regenerated catalyst is fed to the bottom of the reaction zone in the turbulent fluidized bed reactor.

13. The method of claim 9, wherein in the mixture fed from the first reactor feed distributor into the turbulent fluidized bed reactor, the ratio of the molecular moles of aromatics to the carbon moles of methanol and/or dimethyl ether is greater than 0.5.

14. The method of claim 9, wherein the molar ratio of all oxygen-containing compounds in the mixture fed from a plurality of second reactor feed distributors into the turbulent fluidized bed reactor to the methanol fed from the first reactor feed distributor is greater than 1.

15. The method of claim 9, wherein the catalyst regeneration employs at least one of the devices according to any one of claims 6 to 8;

the spent catalyst passes through the reactor stripper, the inclined spent catalyst pipe, the spent catalyst sliding valve and the spent catalyst lift pipe into the dilute phase zone of the fluidized bed regenerator.

16. The method of claim 15, wherein the regeneration medium enters the regeneration zone of the fluidized bed regenerator and reacts with the spent catalyst to removal coke, producing the flue gas containing CO and CO_2 and the regenerated catalyst, and the flue gas is discharged after dust removal by the regenerator gas-solid separator;

the regenerated catalyst passes through the regenerator stripper, the inclined regenerated catalyst pipe, the regenerated catalyst sliding valve and the regenerated catalyst lift pipe into the inlet of the first reactor gas-solid separator, and after the gas-solid separation, the regenerated catalyst enters the bottom of the reaction zone in the turbulent fluidized bed reactor;

the reactor stripping gas enters the reactor stripper via the reactor stripping gas inlet and contacts countercurrent with the spent catalyst, and then enters the turbulent fluidized bed reactor; the spent catalyst lifting gas enters the spent catalyst lift pipe via the spent catalyst lifting gas inlet and contacts cocurrent with the spent catalyst, and then enters the dilute phase zone of the fluidized bed regenerator;

the regenerator stripping gas enters the regenerator stripper via the regenerator stripping gas inlet and contacts countercurrent with the regenerated catalyst, and then enters the fluidized bed regenerator; the regenerated catalyst lifting gas enters the regenerated catalyst lift pipe via the regenerated catalyst lifting gas inlet and contacts concurrent with the regenerated catalyst, and then enters the inlet of the first reactor gas-solid separator, the first reactor gas-solid separator is placed outside the reactor shell of the fluidized bed reactor;

the carbon content of the regenerated catalyst is less than or equal to 0.5wt%.

17. The method of claim 16, wherein the regeneration medium is at least one of air, oxygen-poor air or water vapor; and/or

the reactor stripping gas, the regenerator stripping gas, the spent catalyst lifting gas and the regenerated catalyst lifting gas are water vapor and/or nitrogen.

18. The method of claim 16, wherein the reaction conditions in the reaction zone of the turbulent fluidized bed reactor are: the apparent linear velocity of gas is in a range from 0.1m/s to 2.0m/s, the reaction temperature is in a range from 350°C to 600°C, the reaction pressure is in a range from 0.1MPa to 1.0MPa, and the bed density is in a range from 200kg/m^3 to 1200kg/m^3.

19. The method of claim 16, wherein the reaction conditions in the regeneration zone of the fluidized bed regenerator are: the apparent linear velocity of gas is in a range from 0.1m/s to 2.0m/s, the regeneration temperature is in a range from 500°C to 750°C, the regeneration pressure is in a range from 0.1MPa to 1.0MPa, and the bed density is in a range from 200kg/m^3 to 1200kg/m^3.