



Carbon dioxide purification device for producing urea

Abstract

The utility model provides a carbon dioxide purification device for producing urea. A heat exchanger in the device is connected with the bottom of a cooler through a line pipe, wherein the top of the cooler is connected with a separator through a line pipe; the separator is connected with the heat exchanger through a line pipe, thus forming a circulating closed loop; and the heat exchanger is also connected with a steam heater through a line pipe. By liquefying compressed CO₂, the heat exchanger and other devices separate out non-condensable inert gas components (H₂, N₂, CO, CH₄ and the like) and heavy components such as oil and water. By adopting the device, on one hand, the concentration of the CO₂ can be increased, the oil content in the CO₂ gas is lowered, and the conversion rate of urea production and the product quality are effectively improved; on the other hand, the non-condensable inert gas components are separated, a CO₂ dehydrogenation device in the traditional device can be concealed, the emission safety of urea high-pressure exhaust is guaranteed, and meanwhile, the separated non-condensable inert gas components can be recovered as raw materials of previous procedures.

Classifications

- Y02A50/20 Air quality improvement or preservation, e.g. vehicle emission control or emission reduction by using catalytic converters

CN203890067U

China

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Worldwide applications

2014 [CN](#)

Application CN201420241326.9U events

2014-05-13	Application filed by Hubei Sanning Chemical Co Ltd
2014-05-13	Priority to CN201420241326.9U
2014-10-22	Application granted
2014-10-22	Publication of CN203890067U
Status	Expired - Fee Related
2024-05-13	Anticipated expiration

Info: [Cited by \(1\)](#), [Legal events](#), [Similar documents](#), [Priority and Related Applications](#)**External links:** [Espacenet](#), [Global Dossier](#), [Discuss](#)

Claims (3)

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1. the purifying carbon dioxide device for the production of urea, it is characterized in that: heat exchanger (1) via line pipeline is connected with water cooler (2) bottom, water cooler (2) top via line pipeline is connected with separator (3), separator (3) via line pipeline is connected with heat exchanger (1), forms circulation closed circuit.
2. the purifying carbon dioxide device for the production of urea according to claim 1, is characterized in that: heat exchanger (1) via line pipeline is also connected with steam heater (4).
3. the purifying carbon dioxide device for the production of urea according to claim 1, is characterized in that: separator (3) top and bottom are provided with emptying pipe.

Description

A kind of purifying carbon dioxide device for the production of urea

Technical field

The utility model relates to a kind of purifying carbon dioxide device for the production of urea, belongs to chemical industry equipment field.

Background technology

In urea production process, the height of carbon dioxide purity is directly connected to the stable of urea and economy operation, general requirement CO₂ purity is greater than 95.7%, and purity is higher, and urea consumption is lower; Purity is lower, and urea consumption can increase considerably, and can cause system balancing to destroy when serious, cannot operate; And wherein contained wet goods heavy constituent carbonaceous organic material, by form fouling or carbon distribution under the hot environment of urea production, affects heat exchange efficiency, pollute again urea and reduce urea quality.

In tradition urea production, feed carbon dioxide need be passed through desulfurization, dehydrogenation operation, because of smart desulfurization and catalysis dehydrogenation reaction and follow-up high pressure loop equipment anticorrosion needs, need add the oxygen that accounts for total amount 0.5 ~ 1%, as number of patent application: CN01128500.1, " method of dehydrogenating of CO₂ raw material gas for synthesizing urea "; In adding air, again the rare gas element such as 79% nitrogen that accounts for air total amount is added wherein, to prevent that urea high-pressure system emptying end gas is within limits of explosion, thereby cause carbon dioxide gas purity to decline. And the raw material CO₂ obtaining with pressure swing adsorption decarbonization flow process₂, concentration only 95 ~ 96%, after adding air, concentration is lower.

In above-mentioned traditional technology, in unstripped gas, removing of hydrogen need add oxygen, and under certain temperature, pressure environment, under noble metal catalyst effect, hydrogen and oxygen generate water, cause the waste of syngas for synthetic ammonia.

Reciprocating carbon dioxide gas compressor generally needs to inject a certain amount of lubricating oil in cylinder, to reduce the frictional coefficient between piston ring and cylinder body, improve the work-ing life of component, but also unavoidably cause can bringing a small amount of lubricating oil in carbon dioxide, if this part lubricating oil is brought in follow-up urea plant, can affect urea quality.

Summary of the invention

The utility model provides a kind of refining plant of the carbonic acid gas for the production of urea, and this device is applicable to CO₂ for the urea production process of raw material, can effectively improve CO₂ concentration, reduces CO₂ oil-contg in gas, and can recycle hydrogen, the carbon monoxide etc. harmful to urea production.

For the production of a purifying carbon dioxide device for urea, heat exchanger via line pipeline is connected with water cooler bottom, and water cooler top via line pipeline is connected with separator, and separator via line pipeline is connected with heat exchanger, forms circulation closed circuit. Heat exchanger via line pipeline is also connected with steam heater. Separator top and bottom are provided with emptying pipe.

The utility model is achieved in that a kind of purifying carbon dioxide device for the production of urea, the CO after compressor compression gas, through interchanger, with the liquefaction CO after purification out from separator carry out heat exchange cooling, then through supercooler, reduce CO₂ temperature to liquefying-point liquefies below, and the heavy constituent such as oil, water after liquefaction in carbonic acid gas is discharged and carbon dioxide separation from separator bottom, not solidifying rare gas element (H₂, N₂, CO and CH₄) discharge and reclaim from top; The pure carbonic acid gas of liquefaction from separator middle part out, then by interchanger, with the CO from carbon dioxide compressor gas carries out heat exchange, from interchanger out be the carbonic acid gas purification.

CO after compressor compression gas is the gas after smart desulfurization, pressure range 2.0 ~ 15.0MPa.

The noncondensable gas of discharging from separator top contains H₂, N₂, CO and CH₄, return to front operation as raw materials for production.

A kind of purifying carbon dioxide device for the production of urea that the utility model provides, its advantage is:

1, can effectively improve CO₂ concentration. The present invention passes through CO₂ liquefaction of gases, thus Separation and Recovery wherein profit and noncondensable gas component, can make CO₂ concentration is promoted to more than 99.5%, and corresponding inert gas concentration is reduced to below 0.5%. According to "urea" (Yuan Yi chief editor), the every increase by 1% of inert gas content, transformation efficiency approximately reduces by 0.6%, and the present invention is reduced to foreign gas concentration below 0.5% from 1 ~ 7%, improves Synthesis conversion, reduces urea synthesis pressure, improves output, remarkable in economical benefits. This device is particularly suitable for the flow process such as the pressure swing adsorption decarbonization that feed carbon dioxide concentration is not high.

2, for the urea technique that uses reciprocating carbon dioxide compressor, can reduce CO₂ oil-contg in gas, the heat transfer efficiency of raising urea production equipment, promotes urea quality.

3, can simplify urea production process, remove CO₂ dehydrogenation unit. Because hydrogen is insoluble in liquefied carbon dioxide, can from gas phase, separate, make CO₂ in gas, hydrogen content is less than 100ppm, has ensured urea high-pressure exhaust emissions safety, and hydrogen can recycling.

4, the noncondensable gas (H that separator is separated H₂, N₂, CO, CH₄ deng) can deliver to the front operation recyclings such as decarburization, improve resource utilization; The wet goods heavy constituent that discharge bottom can be delivered to recovery of oil workshop section.

Brief description of the drawings

Fig. 1 is the refining plant structural representation for the production of the carbonic acid gas of urea, 1. heat exchanger, 2. water cooler, 3. separator, 4. steam heater.

Embodiment

For the production of a purifying carbon dioxide device for urea, heat exchanger 1 via line pipeline is connected with water cooler 2 bottoms, and water cooler 2 top via line pipelines are connected with separator 3, and separator 3 via line pipelines are connected with heat exchanger 1, forms circulation closed circuit. Heat exchanger 1 via line pipeline is also connected with steam heater 4. Separator 3 tops and bottom are provided with emptying pipe.

The purification process that adopts said apparatus to carry out carbonic acid gas is:

From the CO of the 14.5-15.0MPa of reciprocating carbon dioxide compressor gas, first through over-heat-exchanger 1, with from separator out liquid carbon dioxide carry out heat exchange, reduce temperature, then through supercooler 2, cool the temperature to 20 ~ 30 DEG C, after temperature reduces, liquefied carbon dioxide is stored in separator 3, and the carbonic acid gas proportion after liquefaction is at 400 ~ 900kg/m³, oil wherein and water b are deposited on bottom, get rid of from separator 3 bottoms, and not solidifying rare gas element c, is mainly H₂, N₂, CO, CH₄ deng, discharge and separate from top, liquefaction carbonic acid gas from separator 3 middle parts out, by heat exchanger 1, carry out heat exchange with the carbonic acid gas from carbon dioxide compressor, reclaim heat, the carbonic acid gas after purification passes through steam heater 4 again, be heated to 100-120 DEG C, send into Urea Conversion System.

Cited By (1)

Publication number	Priority date	Publication date	Assignee	Title
CN106368655A *	2016-10-27	2017-02-01	中国科学院力学研究所	Low-temperature high-pressure liquid state CO ₂ replacement device and using method thereof
Family To Family Citations				

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
CN102585951B	2014-03-12	Process for co-production of liquefied synthesis gas, pure hydrogen and methanol from coke-oven gas
CN103011198B	2014-09-17	Process for preparing synthetic ammonia with coke-oven gas
CN102517108A	2012-06-27	Technology for preparing liquefied natural gas and liquid ammonia by using coke oven gas
CN203923123U	2014-11-05	A kind of device that reduces low-temperature rectisol methane rate of loss

CN102538398A	2012-07-04	Process and system for purifying, separating and liquefying nitrogen-and-oxygen-containing coal mine methane (CMM)
CN102267921A	2011-12-07	Continuous processing technology for synthesis of oxamide
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CN203890067U	2014-10-22	Carbon dioxide purification device for producing urea
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CN107245357A	2017-10-13	A kind of energy saving technique for coal gasification synthesis gas preparing natural gas
CN102101644A	2011-06-22	Method for preparing ammonia synthesis gas from iron alloy smoke
CN209558777U	2019-10-29	A kind of cryogenic liquefying separator of tail of semi coke
CN204508803U	2015-07-29	The device of a kind of high efficiency separation synthetic gas hydrogen making and carbon monoxide
CN111530238A	2020-08-14	Carbon dioxide capturing and utilizing system integrated with steel mill and using method thereof
CN102491270B	2013-07-10	Purification device and purification method for ammonia synthesis raw material gas
CN202470622U	2012-10-03	Purifying, separating and liquefying system for nitrogen-oxygen-containing coal-mine gas
CN204752197U	2015-11-11	Synthetic ammonia synthetic gas self-loop cryogenic separation purifier
CN102424384A	2012-04-25	Carbon dioxide purification method for urea production
CN107399737A	2017-11-28	A kind of preparation method of high pressure vapor carbon dioxide for gasification of high-pressure pulverized coal
CN212396319U	2021-01-26	Carbon dioxide capture and utilization system integrated with steel mill
CN109019600B	2020-10-16	Device for co-producing industrial grade, food grade and high-purity liquid carbon dioxide by multi-tower rectification
CN102491367A	2012-06-13	Process for producing synthetic ammonia by continuously gasifying in oxygen-enriched way
CN207451973U	2018-06-05	A kind of device using carbon dioxide production normal propyl alcohol
CN211035226U	2020-07-17	Synthetic ammonia decarbonization system for improving production capacity

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
CN201420241326.9U	2014-05-13	2014-05-13	Carbon dioxide purification device for producing urea

Applications Claiming Priority (1)

Application	Filing date	Title
CN201420241326.9U	2014-05-13	Carbon dioxide purification device for producing urea

Legal Events

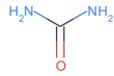
Date	Code	Title	Description
2014-10-22	GR01	Patent grant	
2014-10-22	C14	Grant of patent or utility model	
2021-04-23	CF01	Termination of patent right due to non-payment of annual fee	Granted publication date: 20141022 Termination date: 20200513
2021-04-23	CF01	Termination of patent right due to non-payment of annual fee	

Concepts

machine-extracted

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Name	Image	Sections	Count	Query match
Urea		title,claims,abstract,description	71	0.000



<ul style="list-style-type: none"> carbon dioxide 		title,claims,abstract,description	39	0.000
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<ul style="list-style-type: none"> manufacturing process 		claims,abstract,description	20	0.000
<ul style="list-style-type: none"> Urea 		claims	3	0.000
<ul style="list-style-type: none"> water 		claims	2	0.000
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<ul style="list-style-type: none"> inert gas 		abstract,description	5	0.000
<ul style="list-style-type: none"> raw material 		abstract,description	5	0.000
<ul style="list-style-type: none"> dehydrogenation reaction 		abstract,description	4	0.000
<ul style="list-style-type: none"> chemical reaction 		abstract,description	3	0.000
<ul style="list-style-type: none"> method 		abstract,description	3	0.000

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