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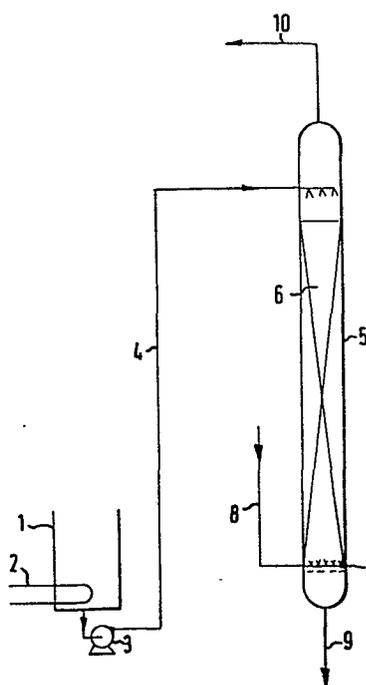
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54 **Recovery of contaminated seal oils.**

57 A process for the removal of volatile components (light hydrocarbons and/or H₂S) from a contaminated seal oil by stripping in countercurrent flow with an inert gaseous material (air, nitrogen, steam) in a tray column or a packed-bed column.



RECOVERY OF CONTAMINATED SEAL OILS

The invention relates to a process for removing volatile components from a contaminated seal oil.

The sealing system of large rotary compressors, such as those handling natural gas or process gas on a refinery, in many cases
5 consists of two liquid-film seals with sealing oil admitted to the space between the seal rings at a slightly higher pressure than the gas to be sealed. The sealing oil (which in most cases is a mineral oil based lubricating oil) flows slowly past both seal rings: the portion which escapes on the atmospheric side of the
10 seal is fit for re-use, but the portion escaping in the high-pressure or gas side of the seal ring will be contaminated with components of these gases, which components are dependent on the composition of these gases and consist of e.g. hydrogen sulphide and/or light hydrocarbons.

15 The seal oil which leaks from the high pressure side of the seal assembly cannot be recycled to the compressor without being purified. Hydrogen sulphide present therein has to be removed because it will be corrosive to the linings of the seals, and light hydrocarbons have to be removed because they dilute the seal
20 oil and lower the flash point thereof, and accordingly increase its flammability.

The invention provides a process for the removal of volatile components from contaminated seal oils by stripping in a specific way.

25 Accordingly there is provided a process for removing volatile components from a contaminated seal oil, which comprises stripping the contaminated seal oil in countercurrent flow with an inert gaseous material in a tray column or a packed bed column.

In case a tray column is used the trays may e.g. consist of
30 valve trays, bubble cap trays or perforated plates.

It is preferred to use a packed bed column, which is a column packed with solid particles, such as ceramic spheres, and in particular Raschig rings. The seal oil to be treated trickles in downward flow over the solid particles and forms liquid films on the surface thereof.

The stripping may be carried out at a wide temperature range. The temperature will in general be adapted to the type of compounds to be removed from the seal oil, and to the inert gaseous material to be used as stripping agent.

Temperatures from 20-120°C are preferred. Atmospheric pressures or somewhat above are very suitable.

An inert gaseous stripping material is a material which does not react with components of the seal oil or the contaminants thereof under the prevailing stripping conditions. Very suitable inert gaseous materials to be used in the stripping are nitrogen, air and steam.

With the process according to the invention volatile components, in particular hydrogen sulphide, can be substantially completely removed from contaminated seal oils, and the recovered seal oil can be recycled to the compressor.

It will be understood that seal oil from which volatile components have been removed according to the process of the invention, cannot be recycled indefinitely to the compressor because non-volatile contaminants will not have been removed. For that reason it is of advantage to remove a minor part of the contaminated seal oil, and add about the same amount of fresh oil to the purified oil to be recycled to the compressor.

The invention is illustrated by way of example in the figure, which is a schematic one.

Equipment which is not essential for the process according to the invention such as liquid and gas meters, heating and cooling equipment, has been omitted from the figure.

Contaminated seal oil present in tank 1 is heated with heating equipment 2 to the required temperature and pumped with the aid of pump 3 via line 4 to the upper part of stripping column 5. Column 5

contains a bed 6 of 9.5 mm ceramic Raschig rings, which bed is supported by grid support 7. Stripping gas is introduced into column 5 below grid support 7 via line 8. Purified seal oil leaves column 5 via line 9. The stripping gas leaves column 5 via line 10.

EXAMPLE

In a two-stage centrifugal compressor a gas, which contains about 7% H_2S , was compressed from 1 bar abs. to 23 bar abs.

In order to keep this gas removed from the seals as far as possible a buffer gas was provided to the labyrinth of the primary seals, so that the gas contacting the seal oil contained about 50 ppm H_2S at 23 bar. The seal oil emerging from the pressure side of the seal contained from 1-100 ppm H_2S and was forwarded to tank 1. In this tank the oil was heated with the aid of a steam coil to about $80^{\circ}C$, forwarded to column 5 which has a diameter of a 0.30 m and contained a bed of 4 m length packed with 2.5 mm Raschig rings, and stripped with nitrogen at a pressure of 1.1 to 1.2 bar abs. The throughput was 1250 l/day of seal oil; the amount of nitrogen used was 1250 l/day. The purified oil did not contain any H_2S , had a flash point of at least 180° , and could be recycled to the compressor. The seal rings on the compressor showed no sign of attack by corrosive agents on the biennial overhaul.

C L A I M S

1. A process for removing volatile components from a contaminated seal oil, characterized in that the contaminated seal oil is stripped in countercurrent flow with an inert gaseous material in a tray column or a packed bed column.
- 5 2. A process according to claim 1, characterized in that a packed bed column is used.
3. A process according to claim 2, characterized in that the packed bed consists of Raschig rings.
- 10 4. A process according to any one of the preceding claims, characterized in that the stripping is carried out at a temperature from 20-120°C.
5. A process according to any one of the preceding claims, characterized in that the inert gaseous material is nitrogen.
- 15 6. A process according to any one of claims 1-4, characterized in that the inert gaseous material is air.
7. A process according to any one of claims 1-4, characterized in that the inert gaseous material is steam.
8. A process according to claim 1, substantially as described with particular reference to the figure.

