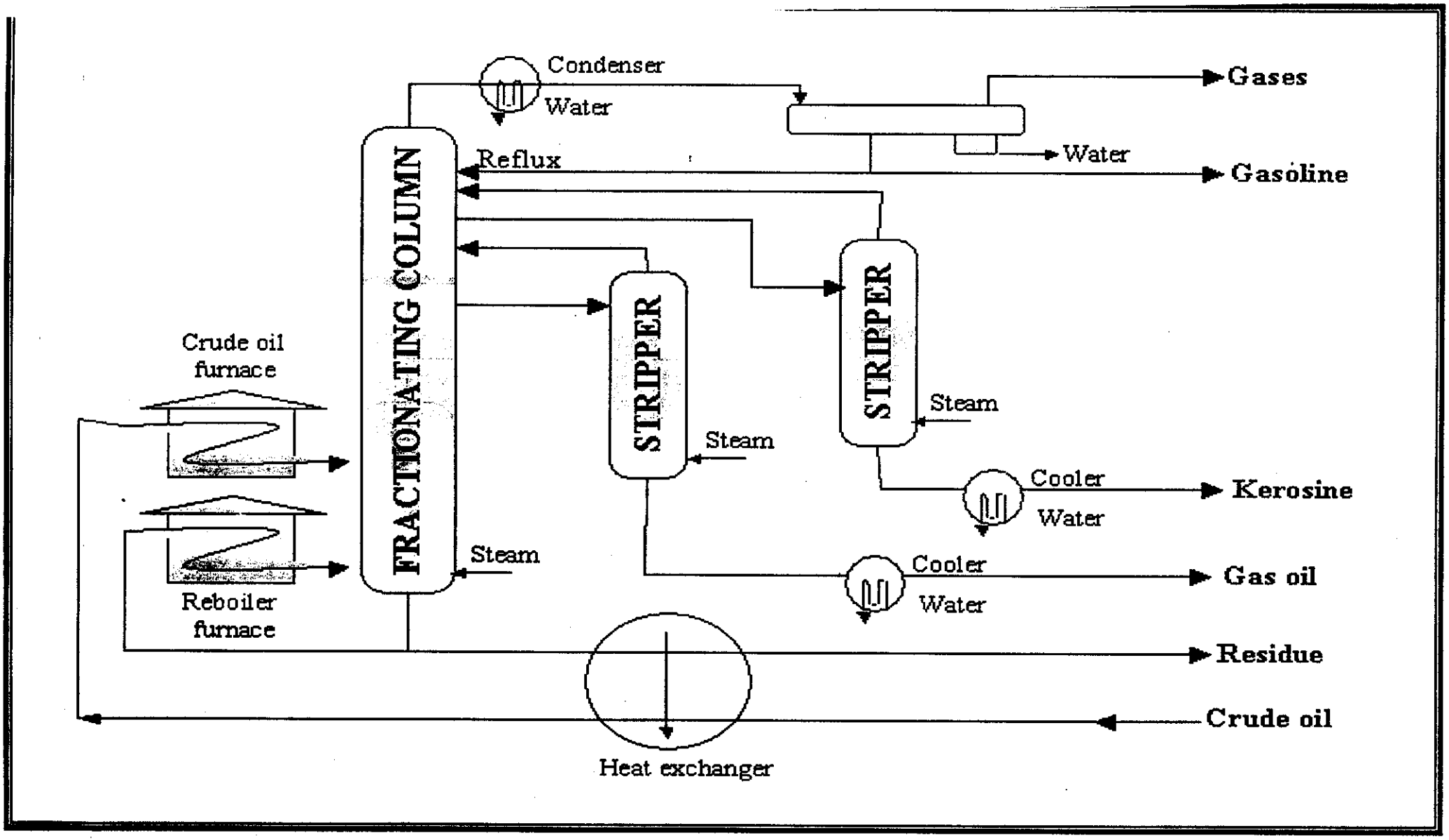

Fig. (1): Atmospheric distillation unit

hydrocarbons with atmospheric boiling points below 350 °C are vaporized and those with higher boiling points remain as liquid and pass into the "stripping" section where any light components are vaporized by the action of steam. The modern crude distiller is designed to maximize yields of high-quality distillates whilst minimizing the fuel/energy requirements by installing optimum heat-recovery systems. [7]

I.2.1.2 Vacuum distillations

To recover additional distillates from long residue, distillation at reduced pressure and high temperature has to be applied. This vacuum distillation process has become an important chain in maximizing the upgrading of crude oil. As distillates, vacuum gas oil, lubricating oils and /or conversion feedstock are generally produced. The residue from vacuum distillation – short residue – can be used as feedstock for further upgrading, as bitumen feedstock or as fuel component.

Three types of high-vacuum units for long residue upgrading have been developed for commercial application:

- Feed preparation units.
- Lube oil high-vacuum units.
- High-vacuum units for bitumen production.

I.2.2 Treatment processes

By a combination of physical and chemical processes, product streams may be purified and otherwise brought up to marketing specifications as to odor, color, stability etc. Hydrotreating, for the removal of sulphur, is the major treating process in refineries. Subsidiary processes are applicable to "specialty" oil products, such as lubricants and bitumen. Which are sold on the basis of their performance

characteristics rather than their energy content. Often the subsidiary processes are carried out in separate installations and are not normally regarded as "refining" processes.

Solvent and physical separation is the main processes used in making lubricating oils, hydrotreating or acid treating bring secondary processes. Most automotive and industrial oils and greases are made with solvent extracted base oils. Extracted and hydrotreated base oils are used mainly for premium quality motor and industrial oils. Finally the most highly refined white oils are produced by hydrotreating, and these are used for a variety of pharmaceutical and food-contact products. [7]

Figure (2) shows a typical flow diagram for lubricating oils production. Heavy fuel oil from the crude unit (Figure 1) is distilled under vacuum to produce lube cuts of different viscosities. Reduced crude also from the crude unit is processed separately in a deasphalting plant to from cylinder stocks. The lube distillates and higher boiling cylinder stocks are all sent separately through a tailored series of the following treating operation:

- Solvent extraction is the major process used to remove aromatics and contaminates.
- Solvent dewaxing improves low temperature fluidity by separating high melting materials. Crude wax obtained as a by-produced is further treated to make finished petroleum wax. The oil produced is suitable as blending stock for some uses or may need further refinement by hydrotreating. [8]

I.2.3 Chemical conversion processes

Although all energy prices have increased over the last ten years, oil prices have shown the greatest increases both relatively and