


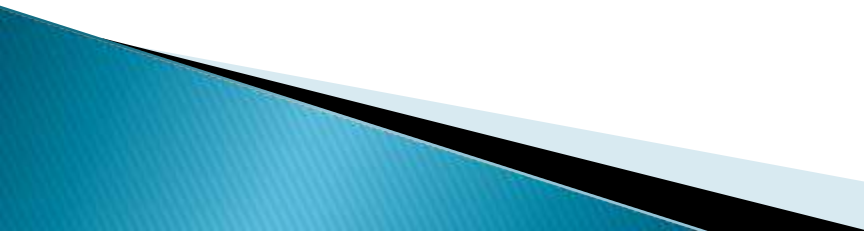
# Lecture - 10

# FUEL OILS

# Fuel oil

- ❖ **Fuel oil** is A fraction obtained from petroleum distillation, either as a distillate or a residue at the oil refinery.
  - ❖ Made of long hydrocarbon chains having high molecular weight compounds called asphaltic bitumen.
  - ❖ Refer only to the heaviest commercial fuel that can be obtained from crude oil, heavier than gasoline and naphtha.
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# Number 1 fuel oil

- ❖ volatile distillate oil
  - ❖ coal oil, stove oil and range oil.
  - ❖ used as a carrier for pesticides, as a weed killer as a mould release agent in the ceramic and pottery industry, and in the cleaning industry. It is found in asphalt coatings, enamels, paints, thinners, and varnishes.
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## Number 2 fuel oil

- ❖ distillate home heating oil.
- ❖ diesel fuel
- ❖ obtained from the light gas oil cut
- ❖ It is used in smelting furnaces, ceramic kilns, and packaged boilers


## **Number 3 fuel oil**

- ❖ distillate oil for burners
- ❖ low-viscosity fuel.

## **Number 4 fuel oil**

- ❖ commercial heating oil for burner
- ❖ obtained from the heavy gas oil cut.

## **Number 5 fuel oil**

- ❖ residual-type industrial heating oil
  - ❖ known as Bunker B.
  - ❖ obtained from the heavy gas oil cut
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## Number 6 fuel oil



- ❖ high-viscosity residual oil
  - ❖ known as residual fuel oil (RFO)
  - ❖ It is limited to commercial and industrial uses where sufficient heat is available to fluidize the oil for pumping and combustion
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Table of fuel oils

Name	Alias	Alias	Type	Chain Length
No. 1 fuel oil	No. 1 distillate	No. 1 diesel fuel	Distillate	9–16
No. 2 fuel oil	No. 2 distillate	No. 2 diesel fuel	Distillate	10–20
No. 3 fuel oil	No. 3 distillate	No. 3 diesel fuel	Distillate	
No. 4 fuel oil	No. 4 distillate	No. 4 residual fuel oil	Distillate/Residual	12–70
No. 5 fuel oil	No. 5 residual fuel oil	Heavy fuel oil	Residual	12–70
No. 6 fuel oil	No. 6 residual fuel oil	Heavy fuel oil	Residual	20–70



# Oil has many uses

1. In automobiles.
  2. Electricity is produced by them
  3. Backup fuel for peaking power plants
  4. Main fuel for small electrical generators.
  5. Large ships are able to use residual fuel oil.
  6. Heavy fuel oils continue to be used in the boiler "lighting up" facility in many coal-fired power plants.
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# Fuel sample storage

- The retained sample should be kept in a safe location, where personnel would not be exposed to vapors which may be released from the sample.
- The retained sample should be stored in a sheltered location where it will not be subject to elevated temperatures, preferably at a cool/ambient temperature, and where it will not be exposed to direct sunlight.



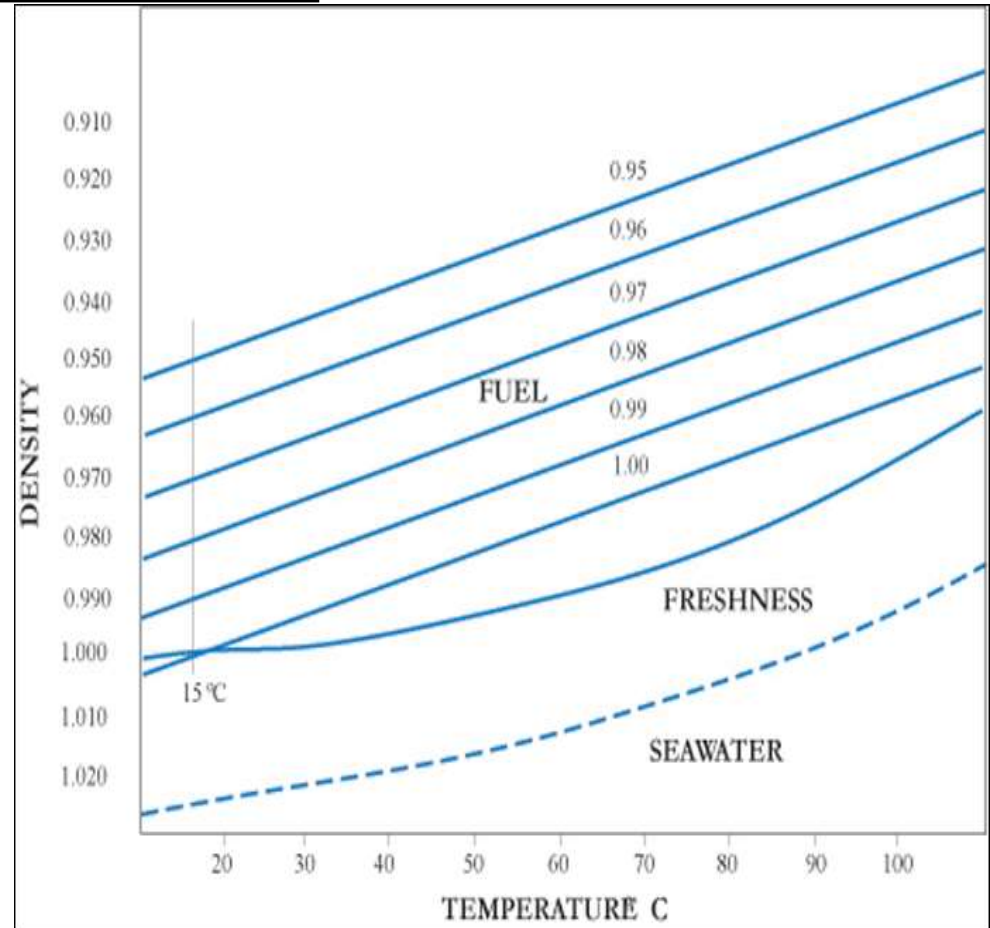
▲ *The Bunker Sample Storage System  
(Bunker Sampler not included).*

# Important Properties and Effects

- ❖ Density and temperature
  - ❖ Viscosity and Viscosity Index
  - ❖ Flash point
  - ❖ Pour point
  - ❖ Carbon content
  - ❖ Sulphur content
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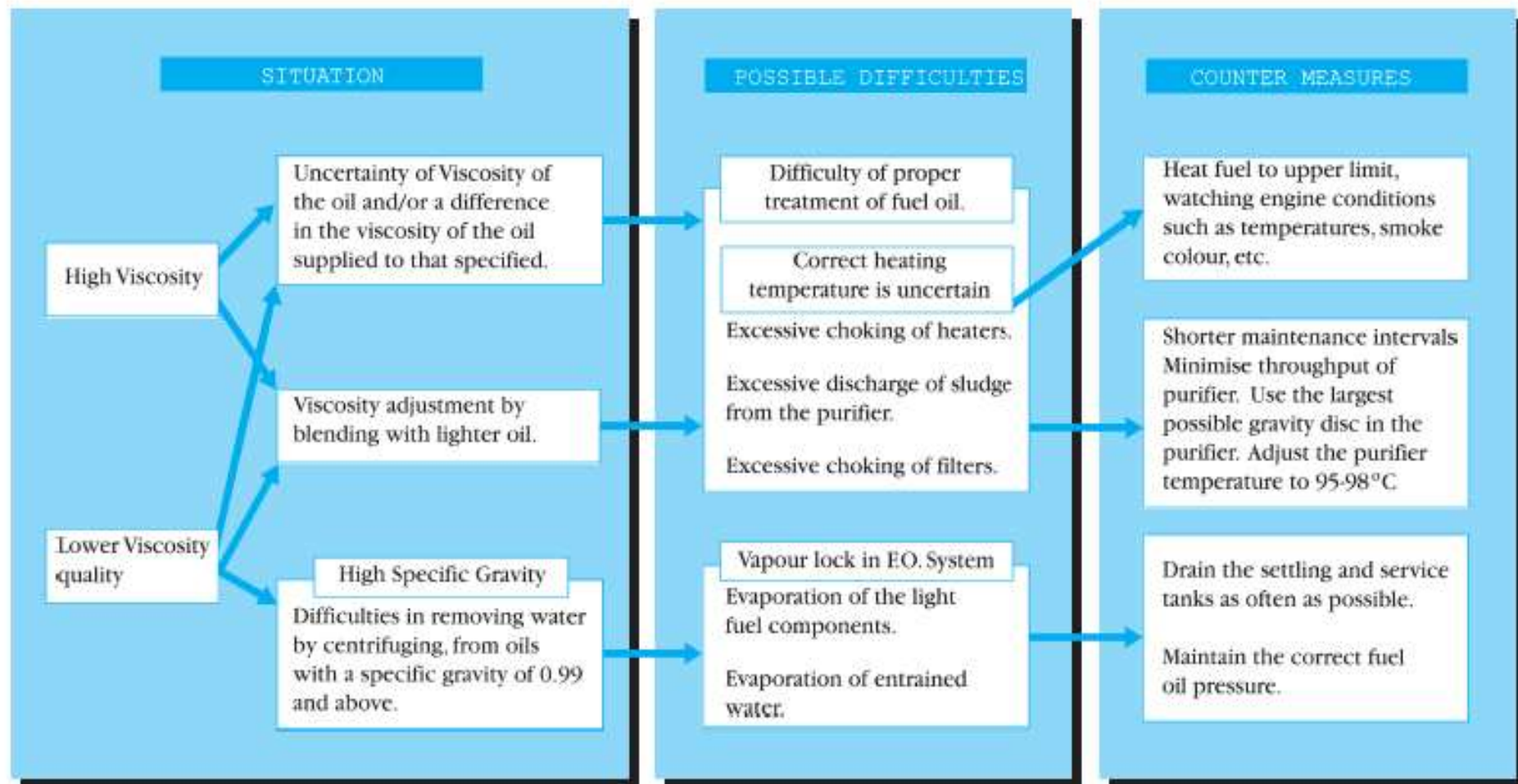
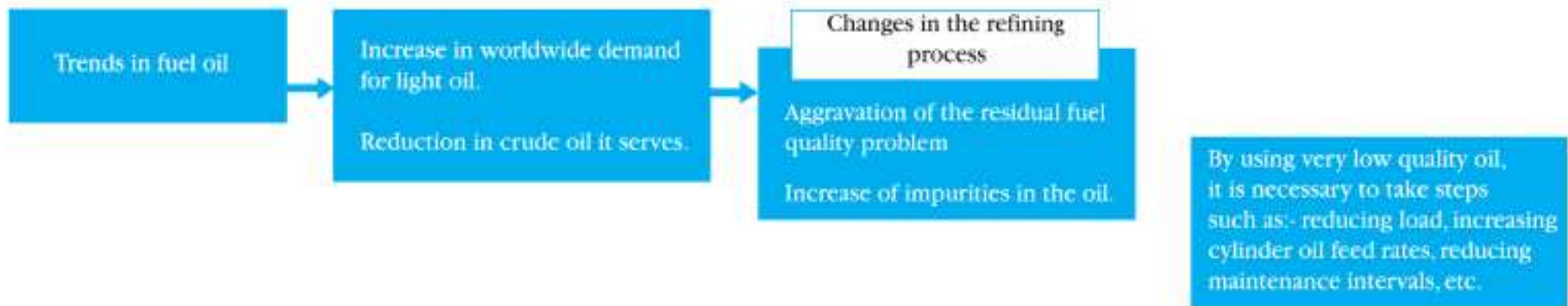
# Density & Temperature

- ❖ D. Varies with T.
- ❖ Density usually quoted at 15 C
- ❖ Density alone is not directly measure of fuel quality, nor always associated with high viscosity
- ❖ The fuel density is important
- ❖ A check on actual weight of supplied/received,  
Specific fuel consumption figures
- ❖ Optimum gravity disc selection for purification equipment




# Viscosity

- ❖ Varies with temperature
- ❖ Viscosity alone is not a measure of fuel quality.
- ❖ The fuel density is important for reasons as followings:
  - ❖ Determine the price (traditionally in marine industry)
  - ❖ Pumping viscosity (usually within 1000 cSt.)
  - ❖ Viscosity at injector to be maintained within limit (8-27 cSt.)



# Flash Point

- ❖ Usually to a minimum flashpoint of 60 °C.
  - ❖ Lower flash point may led the risk of forming an explosive mixture.
  - ❖ concerning maximum allowable tank temperature in relation to flashpoint
  - ❖ an accurate knowledge of flashpoint **TO AVOID THE RISKS**
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# Pour Point

- ❖ Indication of wax content
- ❖ In practice, means the temperature at which wax crystallisation prevents the oil from flowing. use as a guide to **the lowest permitted bunker storage temperature** to avoid handling difficulties
  - ❖ Wax has a low coefficient of heat transfer, and therefore if a high pour point fuel is allowed to cool and become solid in storage tanks it is virtually impossible to re-liquefy by subsequent heating.
  - ❖ Double bottom and wing tanks containing high pour point fuel should be maintained at a temperature above the pour point of the oil and the fuel used as quickly as possible.



- Thank you