



# Engineering Chemistry

CYC 102

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# Overview

- **Boiler Feed water**
- **Requirements of Boiler feed water**
- **Disadvantages of using hard water in Boiler**
- **Priming**
- **Foaming**
- **Summary**
- **References**
- **Topics to be covered in next lecture**



# Boiler Feed Water

- In industry one of chief uses of water is generation of steam by boilers.
- Boiler feed water – the water fed into the boiler for the production of steam.





# Requirements of boiler feed water

**It should have hardness below 0.2 ppm.**

**It must be free from dissolved gases like  $O_2$ ,  $CO_2$ , etc.**

**It should be free from suspended impurities.**

**It should be free from dissolved salts and alkalinity.**

**It should be free from turbidity and oil.**

**It should be free from hardness causing and scale forming constituents like Ca and Mg salts.**



# Disadvantages of using hard water in boilers

○ Carryover: priming and foaming

○ Scale formation

○ Boiler corrosion

○ Caustic embrittlement



# Priming

**It is the process in which some particles in water are carried along with the steam. The resulting process is called as wet steam or carry over. The process of formation of wet steam in boilers is called as priming.**

- **Causes of Priming**

- ✓ Improper boiler design
- ✓ Very high water level in the boiler
- ✓ Presence of finely divided particles in the water
- ✓ Sudden increase in boiling rate
- ✓ High steam velocity

- **Prevention of Priming**

- ✓ Improving boiler design.
- ✓ Fitting mechanical steam purifiers.
- ✓ Maintaining low water level in boilers
- ✓ Using soft water.
- ✓ Decreasing the amount of dissolved salts



Priming



# Foaming

- **Formation of stable bubbles over the surface of water in boiler which do not break easily**
- **Causes of Foaming**
  - ✓ The presence of oil, grease, organic matter or finely divide solids.
  - ✓ Substances which decrease the surface tension of water and increase the
  - ✓ viscosity of the film.
- **Prevention of Foaming**
  - ✓ addition of coagulants such as ferrous sulphate and sodium aluminate.
  - ✓ adding antifoaming agents such as castor oil or polyamides.





# Summary

- Boiler feed water is fed into the boiler for the production of steam.
- Boiler water should be low in hardness, free from alkalinity, dissolved gases, impurities
- Hard water cause-scale, sludge, priming , foaming and corrosion in boiler
- Priming and foaming carry over phenomenon.





# Reference

- O.G Palanna, Engineering Chemistry, Page No. 271-275



# Topics to be covered in Next lecture

- **Boiler corrosion**
- **Caustic embrittlement**
- **Water softening process**



# Thank You!