

Water technology

Review questions:

1. What is the **water hardness**? What causes water hardness?
2. What type of salts cause *carbonate* hardness?
What type of salts cause *non-carbonate* hardness?
3. How to calculate *total hardness*? Give an example.
4. Name a *water soluble salt* that **cause hardness** problems. Explain your answer.
5. $\text{Ca}(\text{HCO}_3)_2$, $\text{Mg}(\text{HCO}_3)_2$, MgCl_2 , KCl , NaCl , CaCl_2 , $\text{Ca}(\text{NO}_3)_2$
Which of these does **not** cause hardness?
6. What is „**water softening**“? Why we have to use this water technology?
7. What is the difference between **water softening** and complete **desalination** (deionisation)?
8. Shortly describe the operation of **anion-exchange** resin?
9. Shortly describe the operation of **cation-exchange** resin?

Corrosion

Review questions:

1. What is the **chemical corrosion**? What is the **electrochemical corrosion**?
2. What **types of corrosion** do you know?
3. What are the necessary and sufficient **conditions** for the **electrochemical corrosion**?
4. **Anodic** or **cathodic** electrode will corrode? Why?
5. What is the role of **depolarizer** in the electrochemical corrosion?
6. Describe the anode process and a cathode process of the **iron (Fe) corrosion**.
7. Write the anode process and a possible cathode process of **copper (Cu) corrosion**.
8. How the dissolved oxygen attack the copper pipe?
9. How to calculate the **loss of material** caused by electrochemical corrosion?
10. What is the **corrosion current**? What is the **corrosion cell**?

Combustion Technology

Review questions:

1. What are the **advantages** of gas-fired heating system?
2. What are the most important characteristics of **natural gas** used for the gas-fired heating system?
3. What is the **excess air**? How we can calculate the **excess air factor**?
4. What are the **components of flue gas**?
5. What is the measuring principle of the flue gas analyzing device?
6. Describe the **calculation of direct efficiency** of a heating system.
7. What is the **gross heating value**?
8. What is the **net heating value**?
9. What is the **flue gas loss**?
10. What is the **relationship** between the *excess air* and the *flue gas loss*?

Lubricants' measurements

Review questions:

1. Shortly describe what the **viscosity of a fluid** is. (Newton law of viscosity)
2. How does **kinematic viscosity** differ from **dynamic viscosity**?
3. What are **engineering units** of dynamic and kinematic viscosities?
4. Shortly describe the temperature dependence of viscosity.
5. What is the **Viscosity Index (VI)**?
What information on the lube oil is carried by Viscosity Index (VI)?
6. What are the most important characteristics of **multigrade oils**?
7. Which oil **VI = 95** or **VI = 110** is better according to the **temperature dependence**?
8. What does the classification of a motor oil **5W/30** means?
9. Which oil has lower viscosity: **SAE 30** or **SAE 40**?
10. What is the **winter grade** and **summer grade** of motor oil?