

## TECHNICAL & ECONOMIC EFFECTS

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### **Boiler-water conditioning (De-aeration).**

#### **Changeable Characteristics of Liquid**

Decrease of gases solubility.

#### **Technical & Economic Effects**

Scum formation reduction. Corrosion reduction.

### **Boiler-water conditioning (Filtration).**

#### **Changeable Characteristics of Liquid**

Decrease of water viscosity. Rate increase of ion-exchange processes.

#### **Technical & Economic Effects**

1. Work duration of ion-exchange filters between regenerations increase from 1.5 - 3x.
2. Decrease of reagents expenses (ion-exchange pitch, chloride, acid, alkali).
3. Water expense decreases for washing.
4. Decrease of salt volume between 1.5 - 3 times.
5. Energy expenses decrease.

### **Boiler-water conditioning (Preliminary softening of crude or circulating water).**

#### **Changeable Characteristics of Liquid**

Decrease of heat capacity. Structural change of crude water.

#### **Technical & Economic Effects**

1. Expense of steam decreases of heating of crude water.
2. Quality of previously softened water clarification increases.
3. Prevention of salt sediments on surfaces of heat exchange.

### **Boiler-water conditioning (Clarifying previously softened water).**

#### **Changeable Characteristics of Liquid**

Decrease of water viscosity.

#### **Technical & Economic Effects**

Productivity of clarifying equipment increases 10-15%

### **Having warmed up water, manufacture of thermal energy.**

#### **Changeable Characteristics of Liquid**

Decrease of water heat capacity.

#### **Technical & Economic Effects**

1. Prevention of salts sediment.
2. Decrease of specific fuel expenses by 8-15%.
3. Decrease of general energy expenses.

### **Having warmed up water, manufacture of thermal energy (Turnaround water supply).**

#### **Changeable Characteristics of Liquid**

Change of physical characteristics of water.

#### **Technical & Economic Effects**

1. Prevention of salts sediment on pipelines and heat exchange equipment.
2. Heat-carrier temperature of heating system increases.

### **Manufacture of steam.**

#### **Changeable Characteristics of Liquid**

Heat of evaporation decreases.

#### **Technical & Economic Effects**

1. Decrease of energy expenses.
2. Fuel expenses decrease by 10-20%.
3. Prevention of salts sediment.



## TECHNICAL & ECONOMIC EFFECTS, CONTINUED

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### **Burning liquid hydrocarbons.**

#### **Changeable Characteristics of Liquid**

Change of viscosity, heat evaporation, & superficial tension.

#### **Technical & Economic Effects**

1. Economy of fuel.
2. Increase of equipment resource.
3. Improvement of ecological impact of manufacturing.

### **Cooling.**

#### **Changeable Characteristics of Liquid**

Heat capacity increases. Structure of cooling water changes.

#### **Technical & Economic Effects**

1. Economy of fuel.
2. Increase of equipment resource.
3. Improvement of ecological impact of manufacturing.

### **Burning liquid hydrocarbons.**

#### **Changeable Characteristics of Liquid**

Change of viscosity, of heat evaporation, & superficial tension.

#### **Technical & Economic Effects**

1. Prevention of salts sediment on pipelines and heat exchange equipment.
2. Productivity of compressors and pumps is increase.
3. Increase of equipment resource.

### **Division suspension (settling, clarification, filtration, centrifuging).**

#### **Changeable Characteristics of Liquid**

Structural change of liquid. Dehydration of ions. Decrease of viscosity.

#### **Technical & Economic Effects**

1. Division speed increases 20-30%.
2. Productivity of equipment increases.

### **Hetero phase chemical and physic-chemical processes on border solid-liquid (lime slaking, ions exchange, dissolution, crystallization).**

#### **Changeable Characteristics of Liquid**

Structural change of liquid. Dehydration of ions. Decrease of viscosity.

#### **Technical & Economic Effects**

1. Rate of lime slaking increases and the lime slaking process' waste decreases.
2. Rate of dissolution and crystallization increases.
3. Exchange capacity of ions exchange filters increases 50-100%.

### **Manufacture of "lime milk".**

#### **Changeable Characteristics of Liquid**

Decrease of water viscosity.

#### **Technical & Economic Effects**

1. Rate of processes increase.
2. Concentration increase of "lime milk".

### **Chemical purification of water.**

#### **Changeable Characteristics of Liquid**

Structural change of water.

#### **Technical & Economic Effects**

1. Rate of processes increase.
2. Work duration of filters between regenerations increase by 2 - 4x.
3. Decrease of reagents expenses.
4. Energy expenses decrease.



## TECHNICAL & ECONOMIC EFFECTS, CONTINUED

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### **Absorption of SO<sub>2</sub> or CO<sub>2</sub>.**

#### **Changeable Characteristics of Liquid**

Structural change of water.

#### **Technical & Economic Effects**

1. Sulfur expenses decrease.
2. Prevention of salts sediment on pipelines and heat exchange equipment.

### **Utensils washing.**

#### **Changeable Characteristics of Liquid**

Structural change of water.

#### **Technical & Economic Effects**

1. Rate of processes increase.
2. Prevention of salts sediment on pipelines, pumps and heat exchange equipment.
3. Decrease of reagents expenses.

