TRAINING PROGRAMME FOR ETP OPERATORS IN TEXTILE INDUSTRY

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

FABRIC Asia

Use of jar tests

GIZ FABRIC – ETP Operator Course

Contents

- Sequence of steps
- Selection of chemicals

Sequence of steps

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Before jar testing

- Keep solutions of different concentrations ready
- Need of dosing at same time

Sequence of steps

- **Step 1:** **Select all coagulants** for testing e.g. ferrous sulphate, alum, poly aluminum chloride (PAC), ferric chloride)
- **Step 2:** Keep **two sets of jars** ready
  - Set 1: Focus on **color removal,**
  - Set 2: Evaluating **reduction of TSS, COD** and **BOD**.

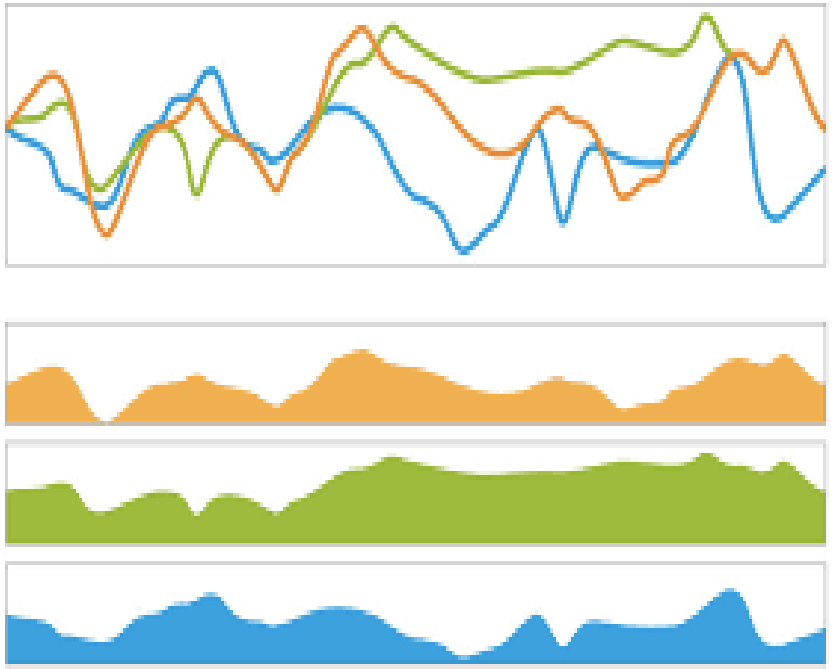
Jar test apparatus

Sequence of steps

- **Step 3** - Prepare **chart for comparing efficiencies of different chemicals** for two 2 sets
- **Step 4** – Identify **optimum chem**ical and **optimum dosage**

Important

1. Compare **removal efficiency**
2. Ascertain **sludge generation**
3. Determine possible **treatment cost**



Sequence of steps

For consideration!

- Reconsider need of coagulant if..
  - no major colour or
  - turbidity of effluent

Selection of chemicals

Selection of chemicals

Common poor practices

Avoid adding chemicals in primary treatment without

- understanding function of chemicals
- distinguishing between coagulants and flocculants

Example

- Usage of coagulants if high level of colloidal solids in raw effluent

Selection of chemicals

Coagulants or flocculants

How to decide

If **colloids high**

- **evaluate** different **coagulants**

If **colloids low** and colour of reactive dyes low

- **check** different **flocculants**

Selection of chemicals

Determining colloid level

- **Step 1**: Filter effluent through 20 microns filter paper (e.g. Whatman 4,) to remove general suspended solids.
- **Step 2**: Filter again through filter paper of <2 microns (e.g. Whatman 602h)
- **Step 3:** Weigh second filter paper to determine colloidal particles level

Lab analytical balance

Selection of chemicals

Determining colloid level

Be aware

- Better results with filter paper <2 µ but tests more difficult
- More accurate analysis by **particle size distribution** (PSD) **analysis** in external laboratory

Selection of chemicals

Typical coagulants

- Ferrous sulphate
- Alum
- Poly aluminum chloride (PAC)
- Ferric chloride etc.

New

- Pre-hydrolyzed inorganic coagulants based on aluminum and iron

Selection of chemicals

Ferrous sulphate

- Widely used in **colour removal** in effluent with **reactive dyes**
- **Not** good for **non-reactive dyes**.
- Small overdose turning effluent reddish when exposed to air
  - eventual oxidation of ferrous sulphate to ferric salt

Selection of chemicals

Flocculants

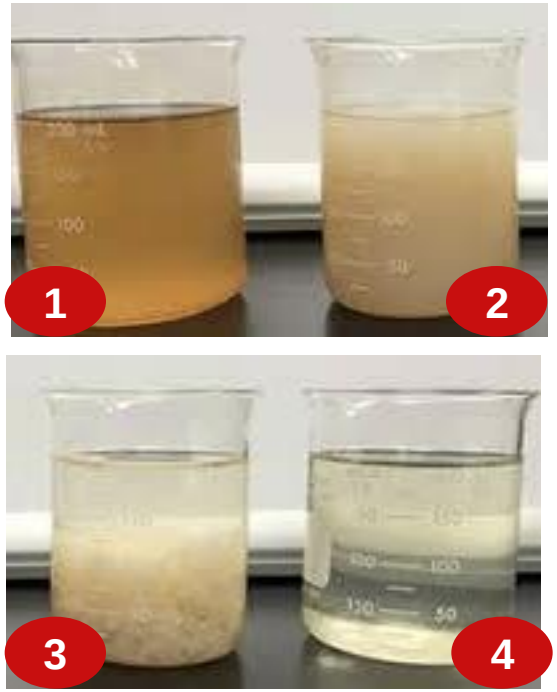
- Many polymer-based flocculants available, mostly with trade names
- Lime also flocculant indirectly aiding coagulation
  - coupled with other flocculants

Different stages of settling

Selection of chemicals

How to select

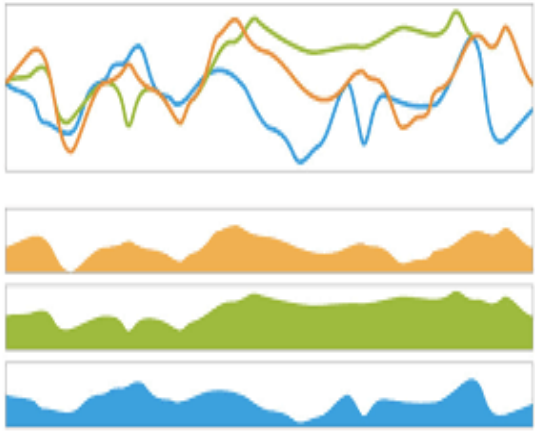
- Check and compare efficiency of different chemicals through **laboratory tests**
- Check features of chemicals while selecting
- Select chemical
  - working **in wide pH ranges**
  - working in **low dosage**
  - producing **less sludge**
  - **not** significantly **increasing TDS**



Selection of chemicals

How to select

- **Tabulate efficiency** of chemicals in simple chart.
- When **combining chemicals** (e.g. alum, lime, polyelectrolyte)
  - **prepare chart** with different dosage combinations keeping **one chemical dose constant** in each case.
- **Select optimum dosage**.
  - When dosing ferrous sulphate, dose till effluent just turning into pale green.



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