**🎯 Activity 1: 🔄 Interactive Flowchart – “Choose Your Softening Method”**

**🎙️ Activity Introduction**

"Let us soften the problem! 💧 Hard water can be stubborn, but you have three powerful methods to fight it. Follow each case, choose the correct solution, and observe the science in action!"

**🛠 Developer Guide Instructions**

* Build an interactive flowchart with three clickable scenario branches.
* For each path, trigger:
  + 📽️ Short animated chemical change.
  + 🧪 Visible chemical equation pop-up.
  + 📊 Side bar tracker showing “Softening Success.”
* Keep the exact scenarios, descriptions, and reactions as written.
* No paraphrasing of chemical equations.
* Ensure each path contains correct and incorrect facilitative feedback for each choice.

**🖥 Learner Instructions (On-Screen)**

* "Click on each scenario to choose the correct softening method."
* "Observe the animation and chemical reaction."
* "Decide which method best suits the type of hardness in the water."

**💡 Hints (On-Screen)**

* "Temporary hardness is removed by heat."
* "Permanent hardness needs chemicals or distillation."
* "Consider cost, practicality, and purity required."

**📜 Activity Content**

| **Scenario** | **Method** | **Interactive Features** | **Chemical Reaction** |
| --- | --- | --- | --- |
| Temporary hardness in tap water | 🔥 Boiling | Animation of bubbling water → CaCO₃ solid | Ca(HCO₃)₂ → CaCO₃↓ + H₂O + CO₂ |
| Soap not working in laundry | 🧂 Washing Soda | Drag Na₂CO₃ to water sample → scum forms and settles | Ca²⁺ + Na₂CO₃ → CaCO₃↓ + 2Na⁺ |
| Lab needs pure water | 💧 Distillation | Simulate evaporation and condensation → clear water | — |

"Which method will you choose? Think about the minerals in the water!"

**🗨 Specific Facilitative Feedbacks for Each Scenario**

**Scenario 1: Temporary hardness in tap water**

* 🔥 Boiling – ✅ "Correct! Boiling removes temporary hardness by precipitating calcium carbonate."
* 🧂 Washing Soda – ❌ "Not quite. Washing soda works for permanent hardness, but boiling is the quicker fix here."
* 💧 Distillation – ❌ "Distillation would work, but it is not necessary for temporary hardness in tap water."

**Scenario 2: Soap not working in laundry**

* 🧂 Washing Soda – ✅ "Correct! Washing soda reacts with calcium ions and allows soap to lather."
* 🔥 Boiling – ❌ "Boiling only removes temporary hardness. Soap issues in laundry are often caused by permanent hardness."
* 💧 Distillation – ❌ "Distillation would work but is impractical for laundry purposes."

**Scenario 3: Lab needs pure water**

* 💧 Distillation – ✅ "Correct! Distillation produces pure water free from all dissolved solids."
* 🔥 Boiling – ❌ "Boiling does not remove all dissolved solids — it is not suitable for laboratory-grade purity."
* 🧂 Washing Soda – ❌ "Washing soda removes hardness but not all impurities — not pure enough for lab experiments."

**🎙️ Activity Conclusion**

"Great flow! Now you know when to boil, add soda, or distil. Choose wisely depending on the type of hardness."