

# Activity Worksheet: Inputs and Outputs in Unit Operations



Name: \_\_\_\_\_

Group: \_\_\_\_\_

Date: \_\_\_\_\_

Location: \_\_\_\_\_

<b>Educational Program:</b>	Technology and Industrial Production (vocational program level 1)
<b>Competence goals from Norwegian curriculum:</b>	<ul style="list-style-type: none"><li>• adjust, operate and monitor machines and simple systems</li><li>• measure pressure, temperature and amount in relation to a work task, and evaluate the measurement result</li><li>• fill out relevant reports and forms in relation to a work task</li><li>• use simple simulation software to describe the entirety and correlations in production processes</li></ul>
<b>Learning goals for this activity:</b>	<ul style="list-style-type: none"><li>• understand the difference between inputs and outputs in unit operations</li><li>• understand how combinations of inputs must be used to achieve the desired conditions in a process</li></ul>
<b>Learning resource:</b>	<ul style="list-style-type: none"><li>• <a href="http://fagstoff.no/inputs-outputs">http://fagstoff.no/inputs-outputs</a></li></ul>

On the learning resource web page you will find the simulator you need for the tasks given below. Play with it and have fun!

## Part One

1. Fill the tank with liquid.
  - a. What did you do to fill the tank?

\_\_\_\_\_

2. Empty the tank.
  - a. What did you do to empty the tank?

- b. Are there alternative ways to empty the tank?

\_\_\_\_\_

3. Select the substance cobalt chloride ( $\text{CoCl}_2$ ), and add a little of it to the liquid in the tank (making a solution). Measure the concentration.
  - a. How can you increase the concentration? Are there several ways to do this?

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- b. Lower the concentration by adding more liquid. What do you do when the tank is full and you want to lower the concentration even more?

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### Part Two

The inputs in a process are the things that we use to manipulate the system. Outputs are the things that changes when we the inputs are altered. What are the inputs and outputs in this simulation? Fill in the table below.

Inputs	Outputs

### Part Three

Make an overview of the relations in the simulator. Use the table below as a starting point. Draw an arrow up or down or horizontal to show how the various inputs affect the outputs.

	Liquid in	Liquid out	Solute in	Evaporation
Concentration				
Liquid level				↓

### Part Four

Use everything you have learned about the relations in the simulated process. Adjust so you have exactly 0.7 liters of liquid in the tank, and a concentration of exactly 2.000 mol/liter. Use the substance potassium chromate ( $\text{K}_2\text{CrO}_4$ ) when doing your experiments.