



Short Course – Computer Assisted Formulation Handout v1B

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Example 1: Part 1- Build the Recipe

TechWizard™ should start in the Formula Development section. To go to the Formula Development section, click the **Formula Dev and Batching** menu and select **Formula Dev** from the View group. If a formula is already loaded in this section, click the **Clear Formula** button.

Set Screen Zoom

Select cells **Ref# to Max**.

Select **Cell Edit** menu and click **Zoom**

Select the **Fit selection** option in the Zoom window and click **OK**.

Open the Starting Formula

Click the **File** menu and select **Open Formula**. The Retrieve Formula window appears.

Select **SC EX 1 Part 1 Starting Formula** and click the **Open** button. Click **Yes** if prompted to continue.

Add Ingredients

Click the **Add Ingredients** button. In the window, click the **USDA Ingredients as Source** tab.

Select the **Ref. #** option in the Search Ingredient List. Enter the reference number provided in the table below.

Click the **Search** button to find the ingredient. Click the **Add** button to add it to the formula. When finished close the window.

Add Amounts

Click the **Formula Dev and Batching** menu and select **Enter Recipe** from the Formula group.

The Recipe Entry Window appears.

Select each ingredient in the table below, enter the amount, select the unit, and click the **Update** button. Click **OK** to close the window. Note: Not all the units are the same.

Table 1. Example 1 Recipe

Ref #	Ingredient	Amount	Units
NDB No. 1077	Milk, whole, 3.25% milkfat, with added vitamin D	1.750	cups
NDB No. 1053	Cream, fluid, heavy whipping	1.500	cups
NDB No. 19335	Sugars, granulated	0.667	cups
NDB No. 1092	Milk, dry, nonfat, instant, with added vitamin A and vitamin D	0.333	cups
NDB No. 1125	Egg, yolk, raw, fresh	38.000	g
NDB No. 2050	Vanilla extract	1.000	tsp

Add Properties

Click the **Add Properties** button. Make sure the **Data Property** tab is selected in the window. Select each property shown below and click the **Add** button. Close the Add Properties window when finished.

Table 2. Example 1 Properties

Data Properties
Milk Allergen
Egg Allergen

What is the composition?

How much of each Allergen is present?

Note the Formula Density in Batching Section

Click the **Batch** button which is above the **Add Ingredients** button. The batching information is shown.

Enter **1** in the blue cell to the right of “**Batch Size:**” and change the units in the batch size dropdown to **gal**.

Note: Be sure to click the **Enter** key on your keyboard or leave the cell so the value is entered. The screen is locked until you do so.

The **Formula Density** is displayed above the “**Batch Size:**”.

Notice that the batch size does not match the total gal in column 2. This is because some of the ingredients are dissolved in the liquid portion.

Save Formula

Click the **Formula Name & ID** box which is above the **Add Ingredients** button. In the window that appears enter the following:

Formula Name: **SC EX 1 Part 1**

Formula ID: **EX 1 1**

Click the **Select** button to set an attached file. Select, “**Sample Attachment F_DEV.docx**” and click **Open** in that window. Click **OK** to close the Formula Name and Notes window.

Click the **File** menu and click **Save Formula**.

Review Attached Document

Click the **Formula Name & ID** box.

Click the **Open** button at the bottom of the window under the heading, **Attached File**.

The file opens in Microsoft® Word®. Close Microsoft® Word®.

Click **OK** to close the Name and Notes window.

This completes EX 1 Part 1.

Example 1: Part 2- Create a Nutrition Facts Label

Go to the Labeling Section

Click the **Labeling** menu and select **Labeling Section** from the View group.

Notice the **Show Ref. Table** button. This provides details on the serving sizes used on Nutrition Facts labels.

Set Screen Zoom

Select cells **Ref#** to **% ADV Unrounded**.

Select **Cell Edit** menu and click **Zoom**

Select the **Fit selection** option in the Zoom window and click **OK**.

Get Formula from the Formula Development Section

Click the **Get Formula from Formula Dev.** button which is above the **Add Ingredients** button.

Answer **Yes** to the prompt and click **OK**.

Sort Ingredients in Descending Order

Click the **Sort** button. In the Sort Ingredients Window, click the **Sort Descending** button. Answer **Yes** to the prompt.

Set Serving Size

The common household unit should be set to 2/3 cup. If it is not, click the **Serving Size** button for the Common Household Unit. Enter **2/3** and click **OK**. Make sure the unit in the dropdown to the right is set to **cup**.

Click the **Serving Size** button for the **Equivalent Metric Quantity** and enter **107** and click **OK**.

Make sure the unit in the dropdown to the right is set to **g**.

Set Number of Servings

Click the **Number of Servings** button, enter **3** and click **OK**.

Set Label Options and View Label

Click the **Label Options** button. It is to the right and down from the **Equivalent Metric Quantity**.

The Label Options window appears. Select the **New Label tab** if it is not already selected.

Select **Standard** for the label type if it is not already selected.

Check the **Dual Column** option.

Enter **321** for **Amount per Container**. Make sure its units are set to **g** in the dropdown to the right.

Click the **Apply** button, click **OK** when prompted, and close the window.

Note Restaurant Menu Information

The Calories per serving in the Nutrition Label would be the value used on a restaurant menu.

View Ingredient Declaration

Click the **Labeling** menu and select **Simple Declaration Editor** from the View group.

Answer **Yes** to the Prompt.

The Simple Ingredient Declaration window appears.

The ingredient declaration is shown at the bottom of the window.

Close the window.

Note: If the ingredient amounts were not in descending order we would need to click the **Sort Declaration - High to Low** button and click **Sort Descending**.

This completes EX 1 Part 2.

Example 2 – Reformulate Using Production Ingredients

Reformulate Using New Ingredients

Load Formula in Formula Development Section

Go to the Formula Development section. Click the **Formula Dev and Batching** menu and select **Formula Dev** from the View group.

If you are continuing from the previous example, then **SC EX 1 Part 1** should still be loaded in this section. *If it is not loaded, we must retrieve the formula. Click the **File** menu and select **Open** formula. The Retrieve Formula window appears. Select **SC EX1 Part 1** and click **Open**. Click Yes if prompted to continue.*

Add the Production Ingredients

Click the **Add Ingredients** button. In the window, click the **File as Source Tab**.

Select each ingredient listed below and click the **Add** button to add it to the formula. When finished close the window.

Table 3. Example 2 Ingredients to Add

Ref #	Ingredient
Twz 0003	*Milk (ICSC)
Twz 0002	*Cream (ICSC)
Twz 0035	*Egg yolk, sugared, raw (ICSC)
Twz 0008	*Sugar, Liquid (ICSC)
Twz 0005	*Skim Milk, Condensed (ICSC)

Reminder - Enter Amount

When entering values in blue cells, be sure to click the **Enter** key on your keyboard or leave the cell so the value is entered. The screen is locked until you do so.

Set Property Amounts

For each of the following properties, enter the amount in the **blue Min cell**.

Table 4. Example 2 Property Min Values

Property	Min
Milkfat	14.563
MSNF	8.163
Sucrose	13.524
Egg Yolk Solids	1.840

After all values are entered, click the **Set to Min** button. This sets the Max amount equal to the Min amount for each property.

Set Ingredient Amounts and Formulate

Set the Min and Max in the **blue cells** to the right of **%(Wt./Wt.)** for each of the following ingredients.

Table 5. Example 2 Ingredient Min / Max values

Ingredient	Min	Max
Milk, whole, 3.25% milkfat, with added vitamin D	0.000	0.000
Cream, fluid, heavy whipping	0.000	0.000
Sugars, granulated	0.000	0.000
Milk, dry, nonfat, instant, with added vitamin A and vitamin D	0.000	0.000
Egg, yolk, raw, fresh	0.000	0.000
Vanilla extract	0.427	0.427

Click the **Formulate** button.

Scale Up Reformulated Recipe

Set Batch Size to 100 gal

Click the **Batch** button which is above the **Add Ingredients** button. The batching information is shown. Enter **100** in the blue cell to the right of **"Batch Size:"** and change the units in the batch size dropdown to **gal**. **Note:** Be sure to click the **Enter** key on your keyboard or leave the cell so the value is entered. The screen is locked until you do so.

The **Formula Density** is displayed above the **"Batch Size:"**. Notice the price per 100 gallons. It is the last value in the **Price Per Batch Size** column.

Determine the Cost of the Finished Ice Cream

Make sure you are still in the batching section. Enter **60** in the blue cell for **% Overrun**. Check the **Include Overrun** check box. The total cost is the last value in the **Price Per Batch Size** column. How much is the price reduced if the overrun is set to 70%?

This completes EX 2.

Example 3: Part 1 – Reduce Fat while Maintaining the Same Ice Content and Sweetness

We are going to reduce the fat content of a formula from 12% to 3%. We wish to maintain the ice content and the sweetness level of the formula.

Retrieve 12% Fat Formula

You need to be in the Formula Development section.

To go the Formula Development section, click the **Formula Dev and Batching** menu and select **Formula Dev** from the View group.

Click the **File** menu and select **Open Formula**. The Retrieve Formula window appears. Select **SC EX 3 Starting Formula** and click **Open**. Click **Yes** if prompted to continue.

Add Properties

Click the **Add Properties** button. The Add Properties window appears.

Click the **Complex Property** tab.

Select **Freezing Point (°F)** and click the **Add** button.

Select **Product Frozen (g ice / 100g) T1** and click the **Add** button.

The Select Temperature window appears. Select the **22°F** option. Click **OK**.

Select **Product Frozen (g ice / 100g) T2** and click the **Add** button.

The Select Temperature window appears. Select the **10°F** option. Click **OK**.

Close the Add Properties window when finished.

Notice the following composition values:

Table 6. Example 3 Formula Composition

Property	Amount	Units
Rel. Sweetness	15.193	g/100g
Freezing Point (°F)	27.51	°F
Product Frozen (g ice / 100g) T1	31.796	@ 22°F
Product Frozen (g ice / 100g) T2	46.117	@ 10°F

Rename 12% Fat Formula and Load in Mix Properties Section

Click the **Formula Name & ID** box. In the window that appears, enter the following:

Formula Name: **12% Fat**

Click **OK** to close the Formula Name and Notes window.

Click the **Mix Properties** menu and select **Get Formula Information** from the Formula group.

When prompted enter **1** and click **OK**. Answer **Yes** if prompted.

Go back to the Formula Development section. Click the **Formula Dev and Batching** menu and select **Formula Dev** from the View group.

Set Initial Property Ranges and Reformulate

For each of the following properties, enter the amount in the **blue Min** and **Max** cells.

Table 7. Example 3 Initial Property Settings

Property	Min	Max
Milkfat	3.000	3.000
MSNF	11.000	11.000
Total Solids		
Sucrose		
Rel. Sweetness	15.000	15.500

Click the **Formulate** button.

Rename 3% Fat Formula and Load in Mix Properties Section

Click the **Formula Name & ID** box. In the window that appears, enter the following:

Formula Name: **3% Fat**

Click **OK** to close the Name and Notes window.

Click the **Mix Properties** menu and select **Get Formula Information** from the Formula group.

When prompted enter **2** and click **OK**. Answer **Yes** if prompted.

Click the **Mix Properties** menu and select **Freezing Properties Plot** from the View group. Notice the difference in ice content.

Go back to the Formula Development section. Click the **Formula Dev and Batching** menu and select **Formula Dev** from the View group.

Add Maltodextrin 5 DE and Formulate

Set **Product Frozen (g ice / 100g) T2 Min** to **46** and Max to **46.5**

Click the **Add Ingredients** button. In the window, click the **File as Source Tab**.

Select ***Maltodextrin (5 DE)** and click the **Add** button to add it to the formula. When finished close the window.

Press the **Formulate** button.

Rename Maltodextrin Formula and Load in Mix Properties Section

Click the **Formula Name & ID** box. In the window that appears, enter the following:

Formula Name: **3% Fat Malto**

Click **OK** to close the Name and Notes window.

Click the **Mix Properties** menu and select **Get Formula Information** from the Formula group.

When prompted enter **3** and click **OK**.

Click the **Mix Properties** menu and select **Freezing Properties Plot** from the View group.

Notice the ice content of the mixes. The mix with Maltodextrin added has the same ice content as the 12% Fat formula.

This completes EX 3 Part 1.

Example 3: Part 2– Reduce Fat & Increase Protein while Maintaining the Same Ice Content and Sweetness

In Part 2 we are going to modify the ice cream formula further. Along with reducing the fat content we will increase the protein content to 6%.

Set the Protein Property & Formulate

Go back to the Formula Development section. Click the **Formula Dev and Batching** menu and select **Formula Dev** from the View group.

Set the Min and Max for the **Protein** property to **6**.

Press the **Formulate** button.

Note that TechWizard™ failed to find a solution.

Increase the Amount of MSNF

Click the **Formula Dev and Batching** menu and select **Composition** from the View group.

Notice that Condensed Skim is the main source of **MSNF** and **Protein**. Click the **Home** button.

Set **MSNF** Min to **11** and Max to **13**. Press the **Formulate** button.

Notice the Protein content is still low but the Lactose content is above 6%. Lactose can crystallize in ice cream during storage.

Add Another Source of Protein & Formulate

Click the **Add Ingredients** button. In the window, click the **File as Source** tab.

Select ***Concentrated Milk Protein (ICSC)** and click the **Add** button to add it to the formula. When finished close the window. Press the **Formulate** button.

Rename Protein Formula and Load in Mix Properties Section

Click the **Formula Name & ID** box. In the window that appears, enter the following:

Formula Name: **3% Fat Malto Protein**

Click **OK** to close the Name and Notes window.

Click the **Mix Properties** menu and select **Get Formula Information** from the Formula group. When prompted enter **4** and click **OK**.
Click the **Mix Properties** menu and select **Freezing Properties Plot** from the View group. Notice the ice content of the mixes.
This completes EX 3 part 2.

Example 4 – Prepare a Nutrition Facts for Ice Cream with Inclusions

Go to the Formula Development section. Click the **Formula Dev and Batching** menu and select **Formula Dev** from the View group.

Retrieve Ice Cream Mix Formula

Click the **File** menu and select **Open Formula**. The Retrieve Formula window appears. Select the formula, **SC EX 2** and click **Open**. Click **Yes** if prompted to continue.

Determine Density with Overrun

Click the **Batch** button which is above the **Add Ingredients** button. The batching information is shown. Check the **Include Overrun** check box. Enter **60** in the blue cell for **% Overrun** and click out of the cell. Note that **Mix Density with 60% Overrun = 0.669 kg/L or 5.57961 lb/gal**

Make Formula an Ingredient

Click the **Formula Dev and Batching** menu and select **Make Ingredient** from the Formula group. When prompted for an ingredient name, enter, ***Vanilla Ice Cream (ICSC)**. When asked if this formula will disperse in water, select **Yes**. The formula has been added to the ingredient file. At this point, the user would need to modify the density of the ***Vanilla Ice Cream (ICSC)** ingredient to be 5.57961 lb/gal which is the density with 60% overrun. This step is not shown.

Create Ice Cream Formula with Inclusions

Clear Formula

Press the **Clear Formula** button above the **Add Properties** button (in Formula Dev section). Answer **Yes** to the prompt then click **OK**.

Add Ingredients

Click the **Add Ingredients** button. In the window, click the **File as Source** tab. Select each ingredient listed below and click the **Add** button to add it to the formula. Close the window.

Add Recipe Amounts

Click the **Formula Dev and Batching** menu and select **Enter Recipe** from the “Formula” group. The Recipe Entry Window appears. Select each ingredient. Enter the amount and unit for each; and click the **Update** button. Click **OK** to close the window.

Table 8. Example 4 Recipe

Ingredients	Amount
*Vanilla Ice Cream (ICSC)	100 gal
*Candies, Fudge Pieces (ICSC)	35 lb
*Candies, Marshmallow Minis (ICSC)	25 lb

Set Formula Density

In this situation, the volumes of all ingredients can be added together to obtain the total volume. The density is the total weight divided by the total volume.

Click the **Formula Dev and Batching** menu and select **Edit Formula Density** from the “Formula” group. The Density Window appears. Click the **Additive Density** button near the bottom of the window. Close the window and answer **Yes** to the prompt.

Determine Serving Size

Click the **Batch** button which is above the **Add Ingredients** button. The batching information is shown. Set **% Overrun** to 0. Set the batch size to **2/3 cups**. Set the **column 1** units to **g**. Set **column 2** units to **cups**. Note the total grams (**99.642**) in 2/3 cups. Note that the batch size and total amount in cups are the same.

Set batch size to **1 pint**. Note the total grams (**298.92**) in 1 pint.

Save Formula

Click the **Formula Name & ID** box. In the window that appears enter the following:

Formula Name: **SC EX 4** Formula ID: **EX 4** Click **OK** to close the window.

Click the **File** menu and click **Save Formula**.

Create a Nutrition Facts Label for the Ice Cream Formula with Inclusions

Move Formula to Labeling Section

Click the **Formula Dev and Batching** menu and select **Create Nutrition Label** from the "Formula" group. Answer **Yes** to the prompt and click **OK**.

Set Serving Size

The common household unit should be set to 2/3 cup. If it is not, click the **Serving Size** button for the Common Household Unit. Enter **2/3** and click **OK**. Make sure the units are "**cup**".

Click the **Serving Size** button for the Equivalent Metric Quantity and enter **100** and click **OK**. Make sure the unit is "**g**". Note this is the serving size (99.642) obtained after rounding to the nearest gram.

Set Number of Servings

Click the **Number of Servings** button, enter **3** and click **OK**.

Set Label Options and View Label

Click the **Label Options** button. The Label Options window appears. Select the **New Label** tab if it is not already selected. Select **Standard** for the label type if it is not already selected.

Check the **Dual Column** option. Enter **299** for the Amount per Container. Make sure its units are set to "**g**".

Click the **Apply** button, click **OK**, and close the window.

Note Restaurant Menu Information

The Calories per serving in the Nutrition Label would be the value used on a restaurant menu.

View Ingredient Declaration

Click the **View/Edit Declaration** button which is above the Nutrition Facts label.

Answer **Yes** to the Prompt. The Simple Ingredient Declaration window appears.

The ingredient declaration is shown at the bottom of the window.

Close the window.