

ACTIVE INGREDIENT MANAGEMENT

& POTENCY-BASED PRICING

IN MICROSOFT DYNAMICS 365

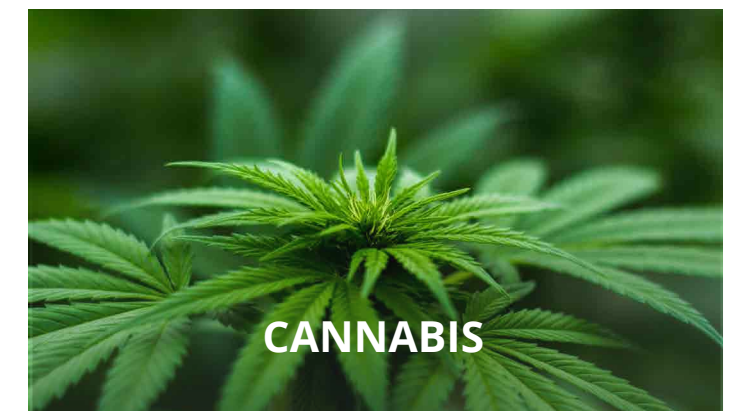
THE CAUSTIC SODA EXAMPLE

xcelpros

EXECUTIVE SUMMARY

- Active Ingredient Management and Potency-based Pricing are highly relevant to process manufacturing, distribution, and other manufacturing industries.
- The products in these industries consist of Active Ingredients, Compensating & Filler Ingredients (sometimes referred to as buffers, fillers and excipients).
- Active Ingredients and Potency have a significant impact on price variations in-turn affecting downstream functions such as customer billing and value.
- In order to calculate potency, it would be required to maintain min, max and target values of batch attributes such as potency, concentration and purity on items, inventory or batches.
- The calculation of a potency-based price that is dependant on the percentage of active ingredient purity or potency can be achieved by maintaining an attribute-based price with algebraic equations.
- The industry requires that the purity and potency of active ingredients be captured at the time of incoming inspection / receipt of the product or at the time of quality testing of goods received.
- Batch attributes, such as potency and purity, captured at various stages of the operation have an impact on the value of physical and financial inventory.
- Unit of measure conversion from weight or volume would be a key element in determining the appropriate price for a certain customer-specific batch and potency requirement.
- Manufacturing an item with a specific active ingredient requires an ability to maintain a specific weight or volume-based formula and be able to balance a batch using compensating and filler ingredients with a compensating factor.

ACTIVE INGREDIENT MANAGEMENT WHICH INDUSTRIES IS THIS RELEVANT TO?



ACTIVE INGREDIENT MANAGEMENT

Active Ingredient Management is critical for organizations that need the ability to directly process purchase or sale transactions in active ingredient quantities. Companies that have products with at least one concentrate (or) one or more active ingredients will benefit by having the active ingredient management functionality built straight into the ERP system. The impact in such cases is on most business processes within the company.

Chemical, Pharmaceutical, CPG and of late Cannabis industries will benefit most from this solution.

ACTIVE INGREDIENT TRACKING

Highly-regulated and process industries such as Chemical, Pharmaceutical or Food & Beverage have an inherent operational need to manage and account for active ingredients.

Batch attributes such as potency and purity are maintained in the system along with pricing based on target values. Behind the scenes, an algebraic equation combines the unit price, quantity, batch attribute - target & actual values and determines an automatically adjusted price within the target transaction such as purchase order or sales order invoice.

A key element for active ingredient management is to be able to capture potency, purity or other batch attributes during quality testing of a batch. This allows you to view inventory by recorded batch attributes and reserve these batches for the appropriate transactions. As stated above, leveraging the pricing formula allows you to implement price adjustments to the downstream transactions based on actual values.

Microsoft Dynamics 365 for Finance & Operations has extensive out-of-the-box functionality to help manage active ingredients for both make and buy items.

ITEM BATCH ATTRIBUTES

Batch Attributes are properties of raw materials, intermediates or finished products that capture the key distinguishing factors for an inventory batch. These attributes vary by industry, use and other factors such as environmental.

As discussed above, in Microsoft Dynamics 365, you have the ability to manage item batch attributes such as potency and purity. The first step would be to create an item that is tracked at a batch level and define batch attributes that can handle a range of potency values. Dynamics 365 allows for managing multiple attributes for the same item, including one primary and multiple secondary batch attributes.

A few examples of batch attributes in different industries -

INDUSTRY	EXAMPLE OF BATCH ATTRIBUTES
Chemical & Pharmaceutical	Potency, Purity, Concentration etc.
Food & Beverage	Fat Content, Percentage Weight, Moisture, Age
Steel / Metals / Mining	% of Magnesium content % of silver content % of zinc content
Cannabis	% of CBD % of THC Purity Contamination etc.

The screens below provide a quick view of what batch attributes look like in Dynamics 365 for Finance and Operations.

Fig 1. Released products - Caustic Soda

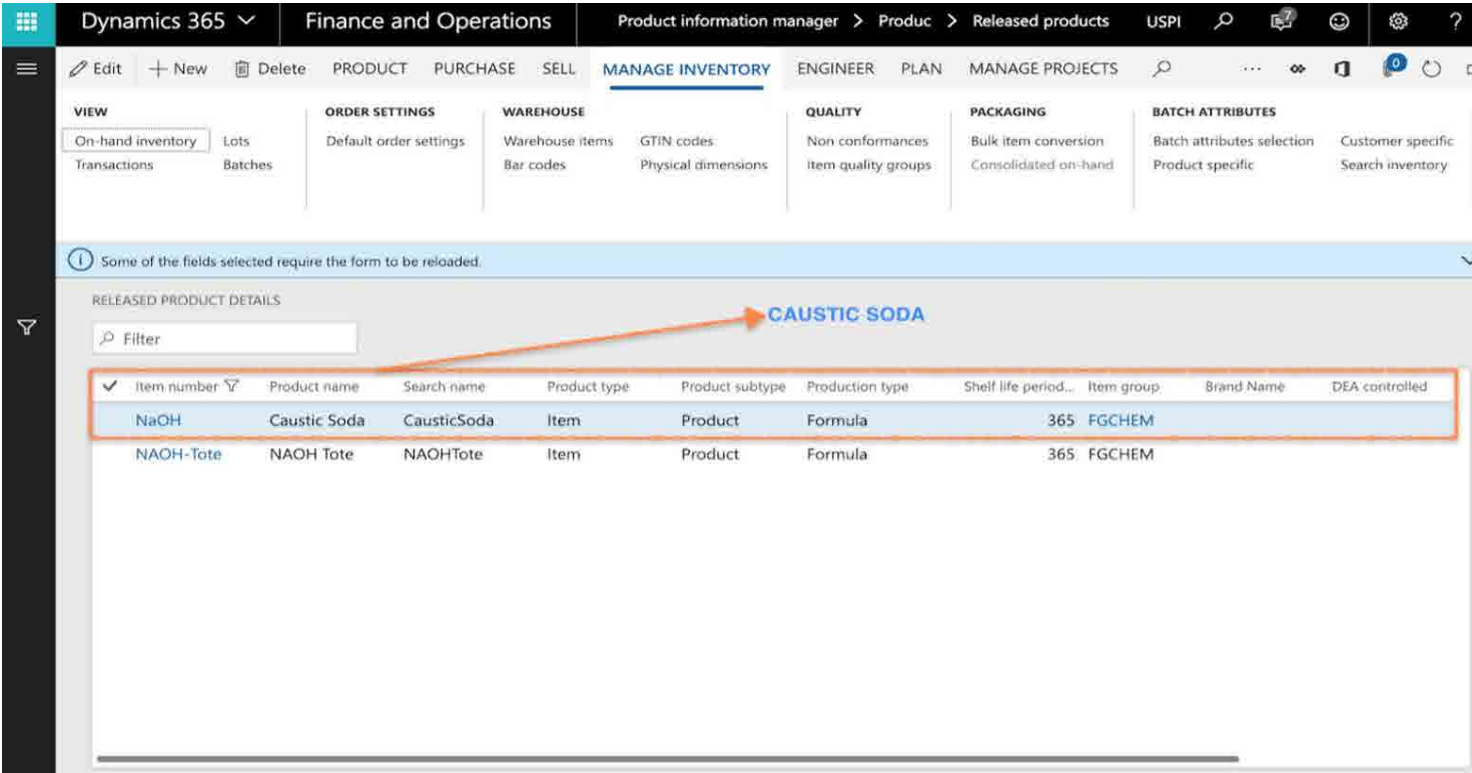
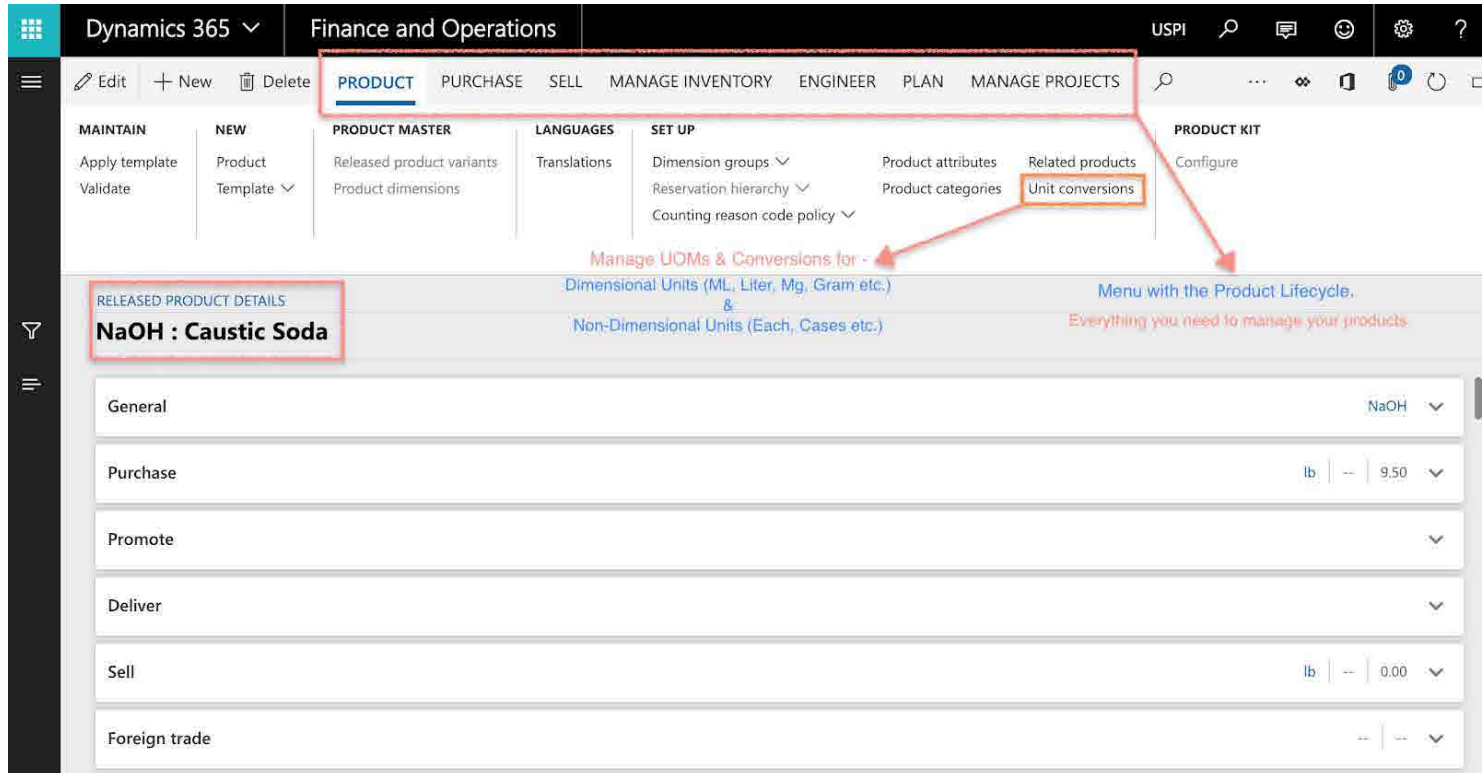
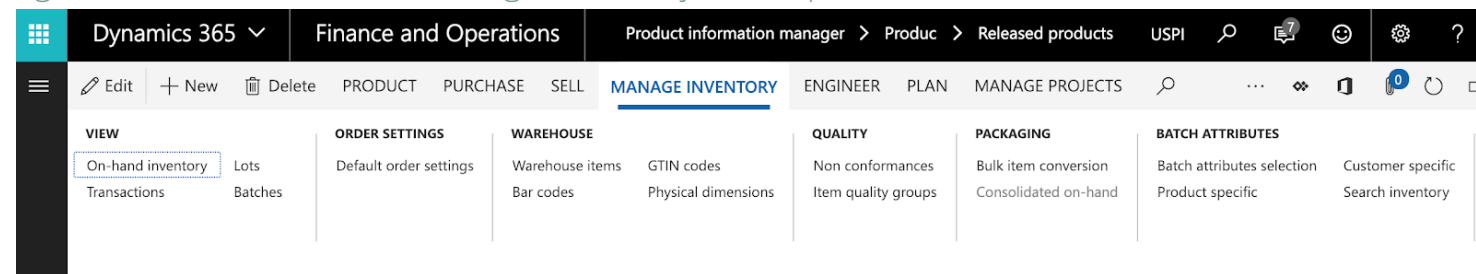


Fig 2. Released Product Details - Product Tab Expanded



ITEM BATCH ATTRIBUTES (CONTINUED...)

Fig 3. Released Products - Manage Inventory Tab Expanded



The screens below show product-specific batch attributes that can be set for either purity or potency with an acceptable range and a target value.

Fig 4. Released Products Attributes - Purity

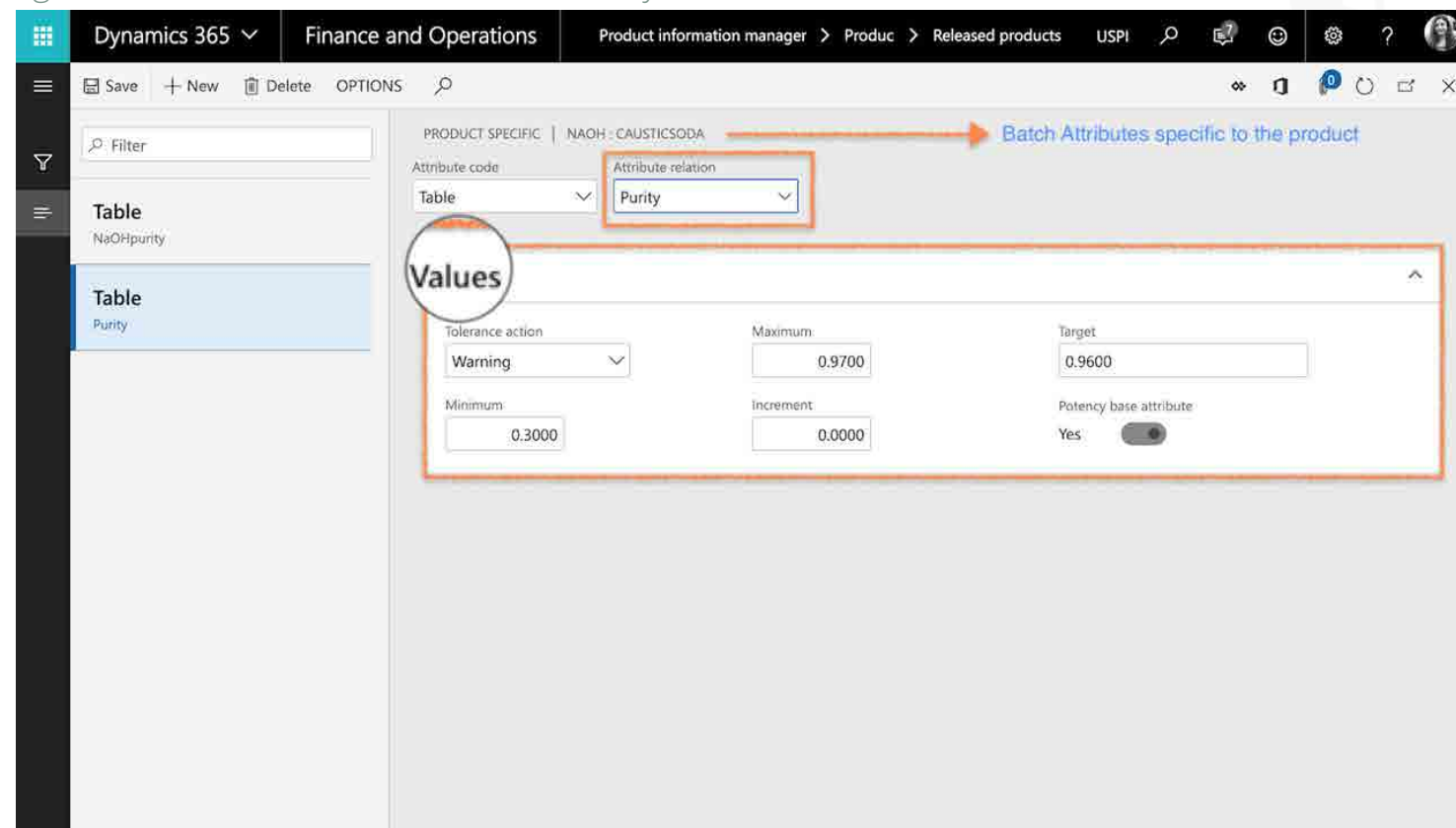
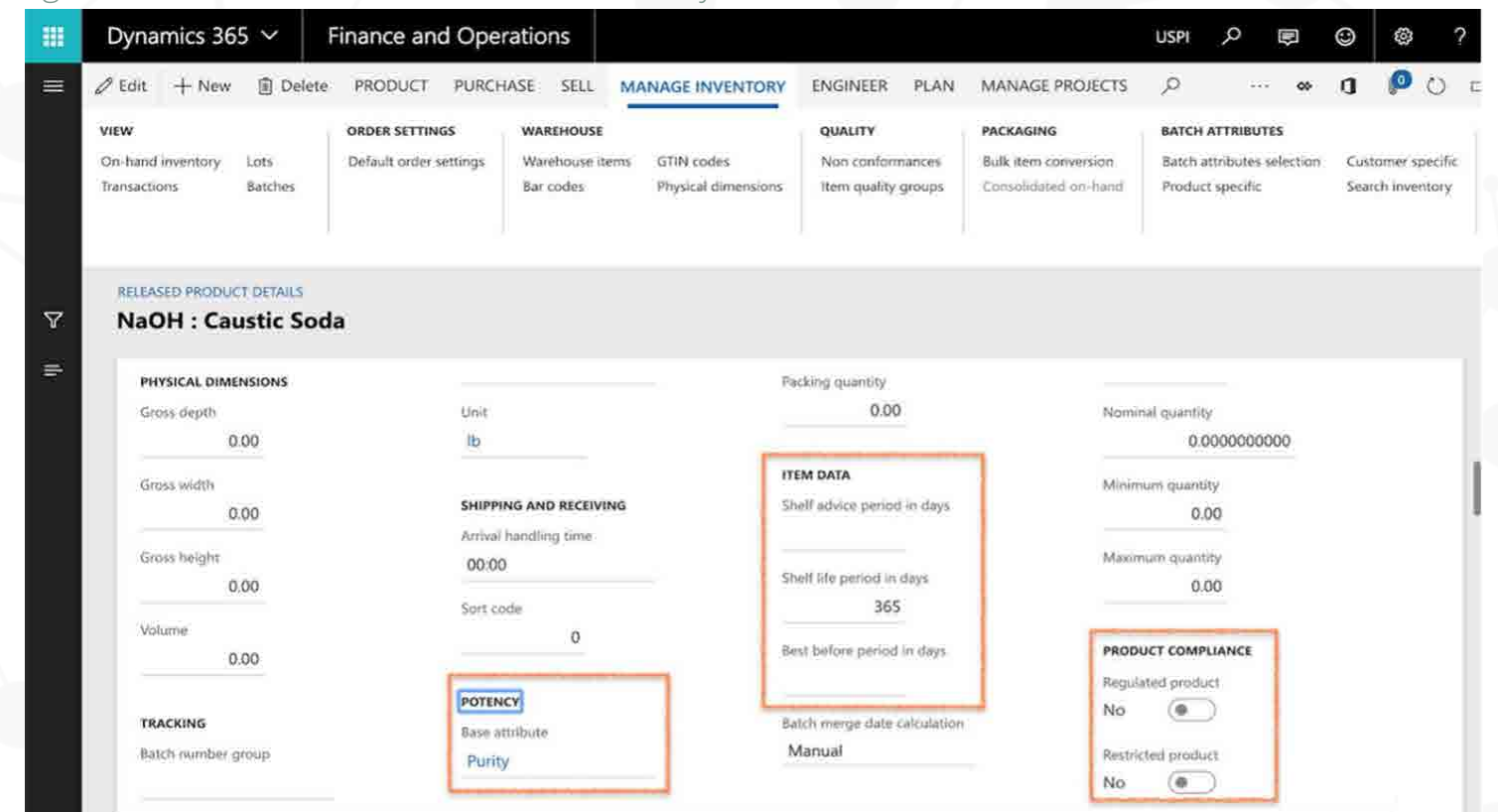


Fig 5. Released Products Attributes - Potency



PURCHASING & RECEIVING ITEMS WITH ACTIVE INGREDIENTS: ATTRIBUTE-BASED PRICING

There are times you may purchase one or more items from an approved supplier with a specific active ingredient and it may be required to track active ingredients' potency at a specific value.

When an item has batch attributes, you receive the item batch and enter the batch attribute value along with the vendor batch details. The attribute-based pricing that is derived during invoicing alters the unit price and net amount based on the potency value of the batch.

Purchase prices for active ingredient purity or potency can be maintained in the attribute-based pricing details section shown in the screen below.

To learn more about the receiving process in Microsoft Dynamics 365, refer to [“An Overview of Chemical Distribution in Microsoft Dynamics 365”](#)

Fig 6. Attribute-based pricing details

The screenshot shows the 'Attribute-based pricing details' window for NaOH. It displays a table of purchase price agreements based on attributes. The table has columns for Relation, Currency, Party code type, Account select..., Product code type, Item, Site, Warehouse, Unit, Attribute-based pricing ID, and From date. Three rows are listed, all for 'Price (purch.)' in 'USD' with 'All' party code type and 'Table' product code type, for item 'NaOH' at site '1' and warehouse '15' in unit 'lb'. The attribute-based pricing IDs are USPI-00002, USPI-00003, and USPI-00004.

Relation	Currency	Party code type	Account select...	Product code type	Item	Site	Warehouse	Unit	Attribute-based pricing ID	From date
Price (purch.)	USD	All		Table	NaOH	1	15	lb	USPI-00002	
Price (purch.)	USD	All		Table	NaOH	1	15	lb	USPI-00003	
Price (purch.)	USD	All		Table	NaOH	1	15	lb	USPI-00004	

Below the table, there are sections for 'PRICES', 'PERCENT', 'DELIVERY', and 'CURRENCY'. The 'PRICES' section shows 'Price unit' as 1.00 and 'Price charges' as 0.00. The 'PERCENT' section shows 'Discount percentage 1' and 'Discount percentage 2' as 0.00. The 'DELIVERY' section shows 'Lead-time' as 0 and 'Disregard lead time' as 'Yes'. The 'CURRENCY' section shows 'Include generic currency' as 'No'.

Fig 7. Attribute-based pricing for Caustic Soda based on Pricing Formulas

The screenshot shows the 'Attribute-based pricing for Caustic Soda based on Pricing Formulas' window. It displays a table of equation elements used in the pricing formula. The table has columns for Equation element, Equation element type, Attribute, and Constant. Five rows are listed, all for 'Batch attribute - Actual' or 'Batch attribute - Target' with a constant of 0.00. The attributes are 'Purity' and 'NaOHpurity'.

Equation element	Equation element type	Attribute	Constant
A	Batch attribute - Actual	Purity	0.00
B	Batch attribute - Actual	NaOHpurity	0.00
C	Unit price		0.00
D	Batch attribute - Target	Purity	0.00
E	Batch attribute - Target	NaOHpurity	0.00

Below the table, there is an 'Equation' section with a 'Validate equation' button and a text area containing the formula $((A/D) + (B/D)) * A$. The window title is 'Attribute Based Pricing for Caustic Soda based on a Price Formula'.

PURCHASING & RECEIVING ITEMS WITH ACTIVE INGREDIENTS: ATTRIBUTE-BASED PRICING (CONTINUED...)

Fig 8. Purchase Orders - Purchase Order Lines

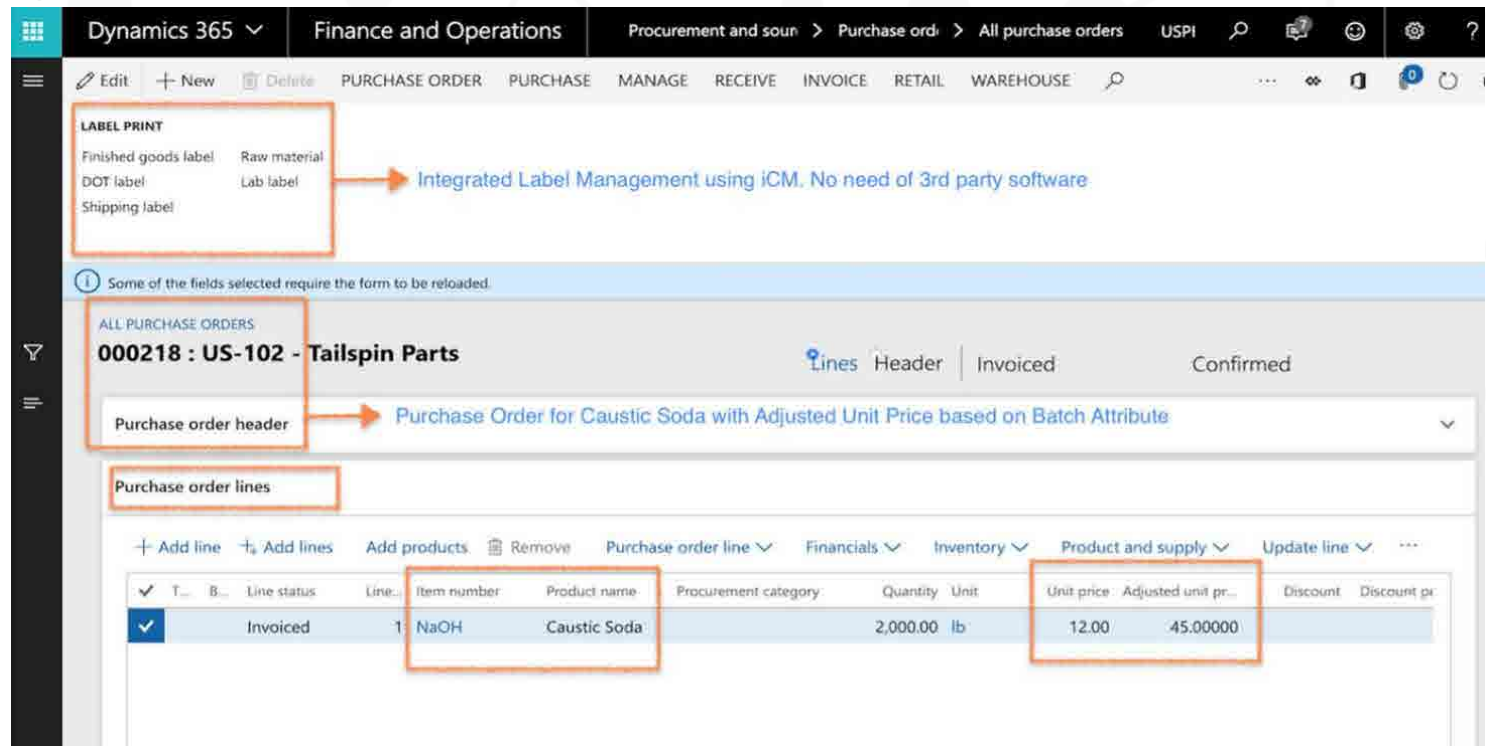


Fig 9. Batch Tracking (These are the batches in inventory with specific batch attributes. You can add / remove columns you want to see in any view)

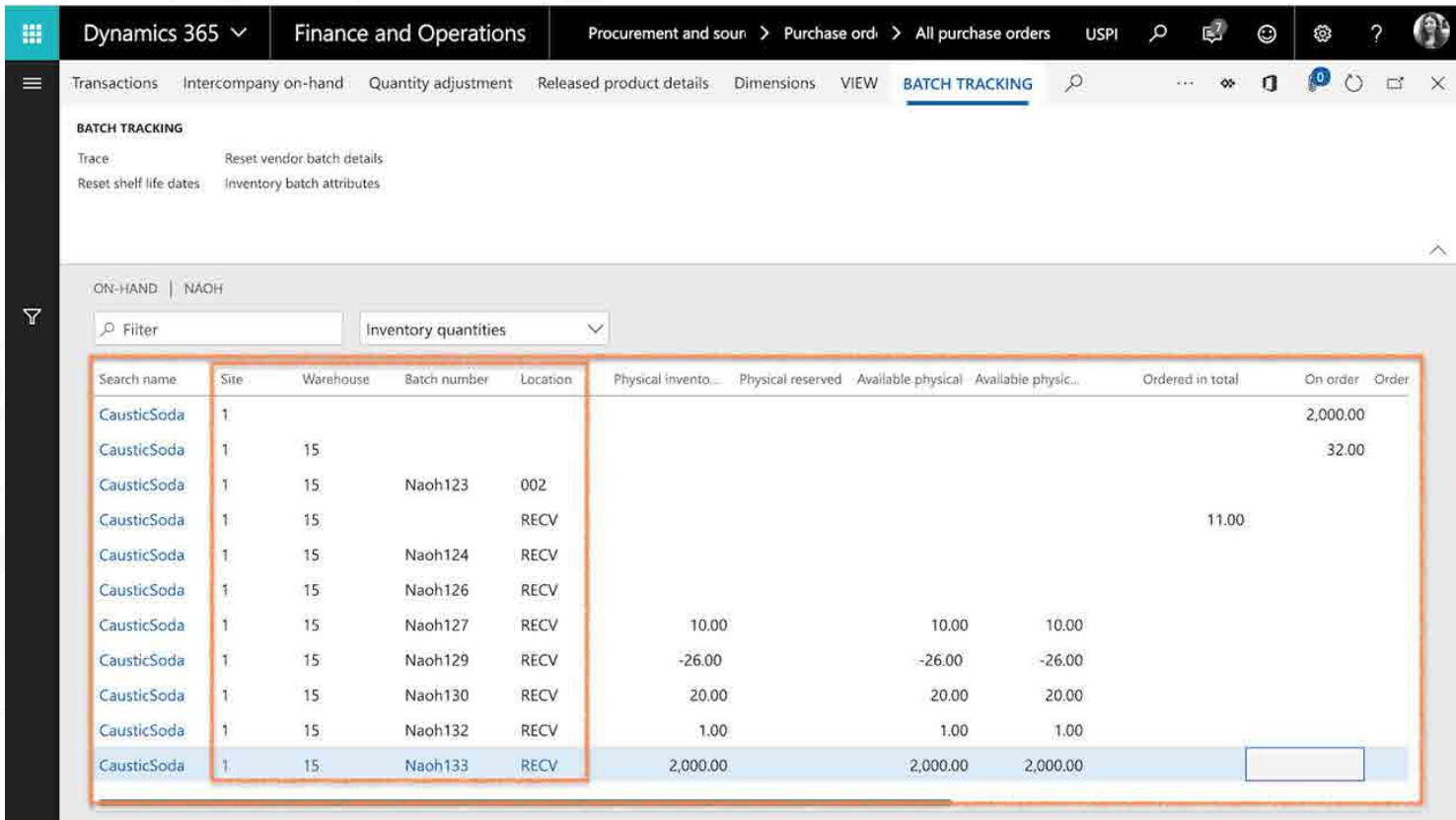
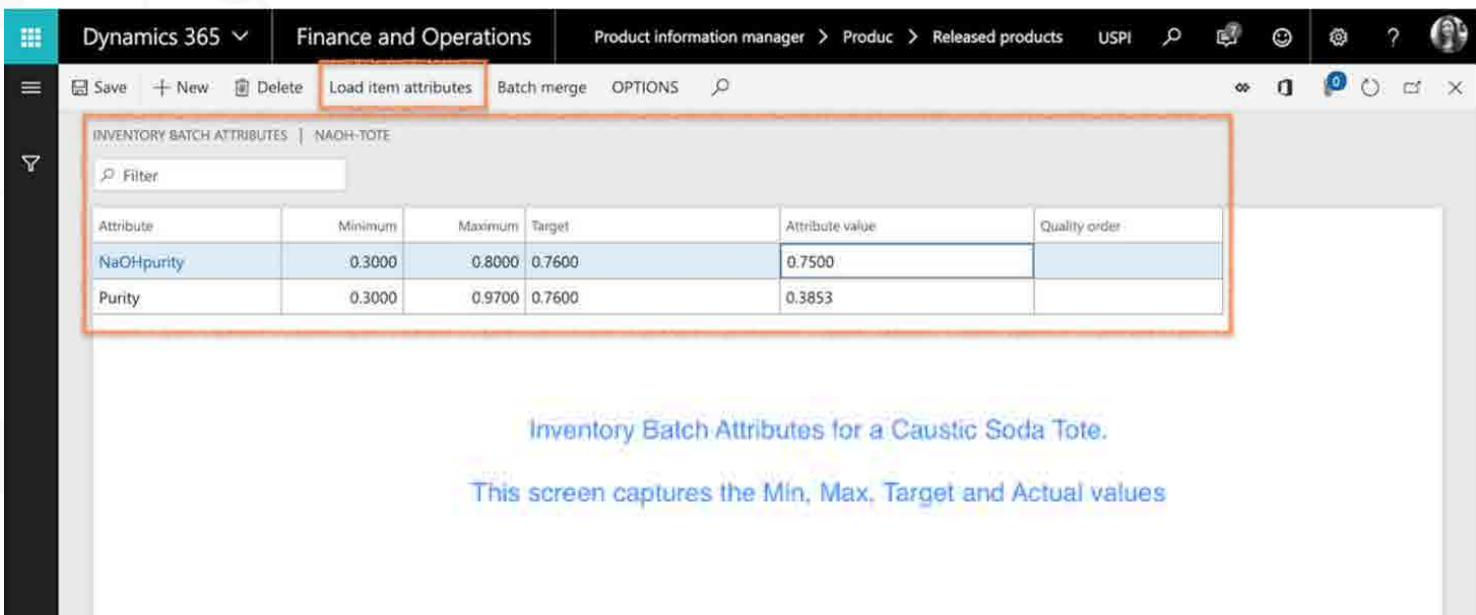


Fig 10. Released Products - Inventory Batch Attributes



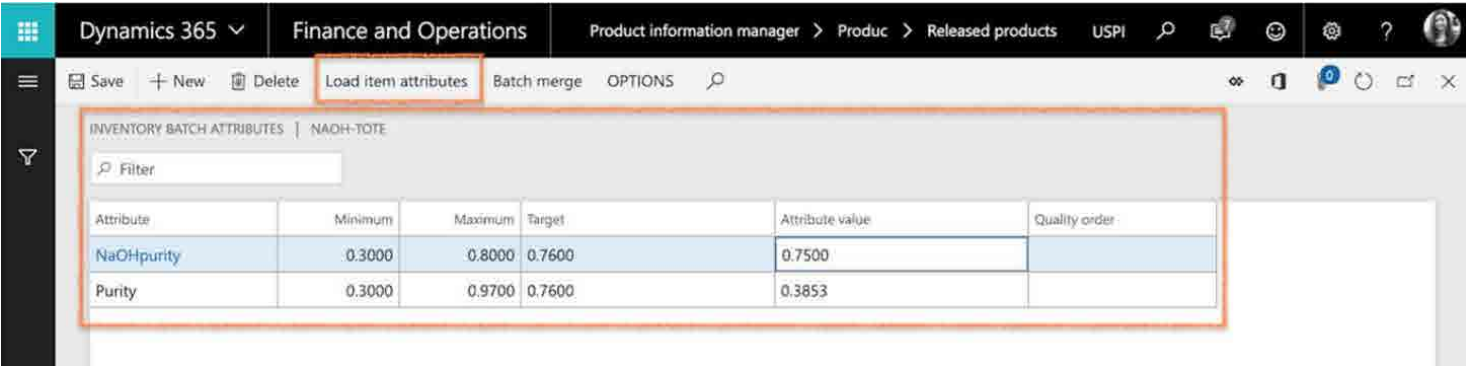
MANUFACTURING WITH ACTIVE INGREDIENTS

Caustic soda is just one example to demonstrate active ingredient management in process industries. The same concepts can be applied to different types of chemicals or products that contain a variety of batch attribute requirements.

A formula is defined by taking active ingredients, compensating & filler ingredients and applying a conversion factor to calculate the totals on batch production. Microsoft Dynamics 365 is able to meet this requirement with the included batch balancing functionality.

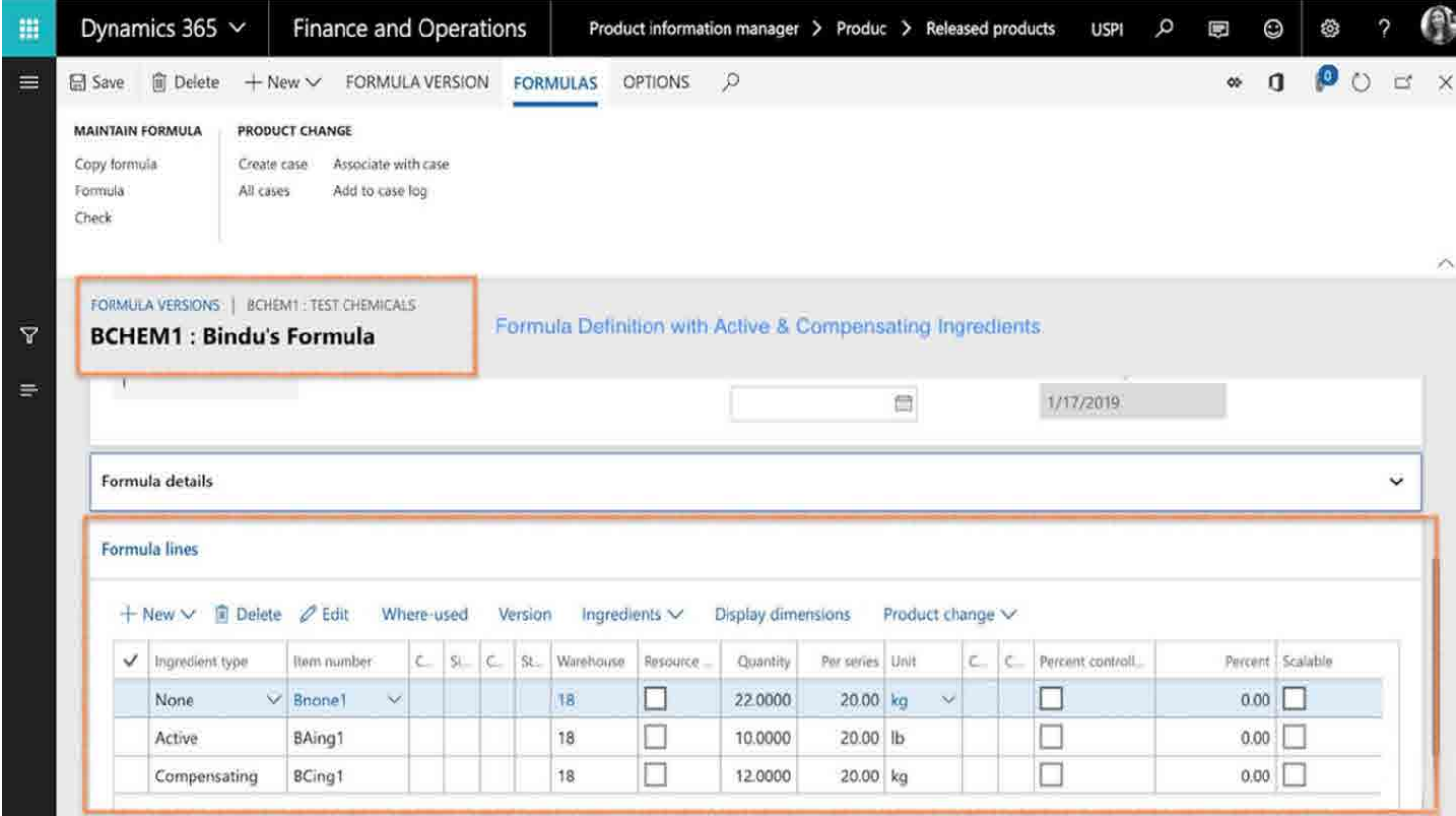
Manufacturing to meet a certain potency by using active ingredients can be tricky if you do not have a way to calculate amounts based on the potency of the active ingredient batch picked during production. When a formula is setup to meet a specific potency requirement, the weight / volume of the active ingredient, compensating ingredient, and filler ingredients need to be defined.

Fig 11. Released Products - Inventory Batch Attributes



Attribute	Minimum	Maximum	Target	Attribute value	Quality order
NaOHpurity	0.3000	0.8000	0.7600	0.7500	
Purity	0.3000	0.9700	0.7600	0.3853	

Fig 12. Released Products - Formulas Details



Ingredient type	Item number	C	SL	C	SL	Warehouse	Resource	Quantity	Per series	Unit	C	C	Percent controll...	Percent	Scalable
None	Bnone1					18		22.0000	20.00	kg				0.00	
Active	BAing1					18		10.0000	20.00	lb				0.00	
Compensating	BCing1					18		12.0000	20.00	kg				0.00	

Formulas can be setup by maintaining the quantities of Active, Compensating and Filler ingredients along with a compensating factor designed to automatically adjust batches.

With a compensating factor, the system will recalculate and adjust batches as needed to produce desired potency values. The compensating factor always refers back to the base value, in order to correctly calculate batch quantities.



(CONTINUED...)

Fig 13. Formula Lines - Compensating Principle

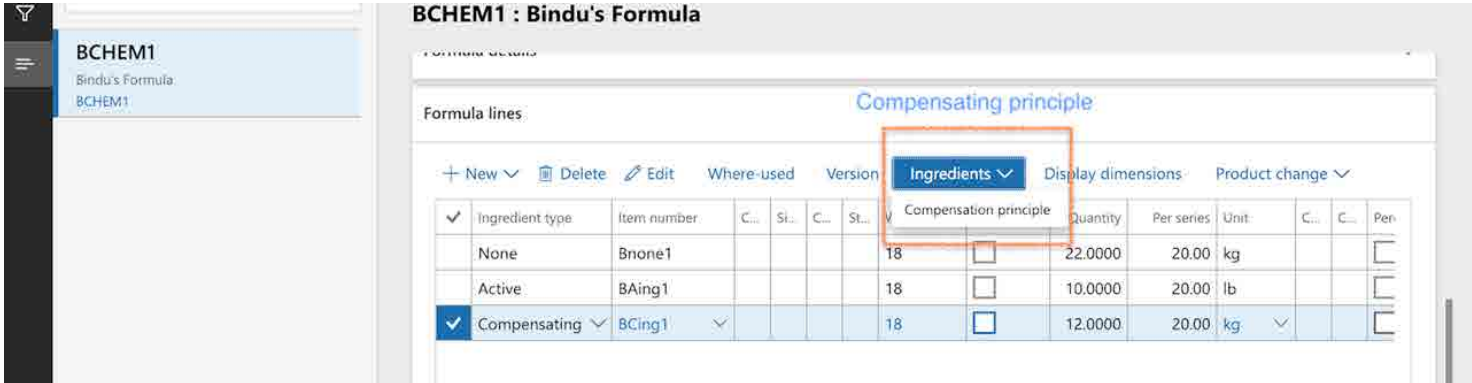
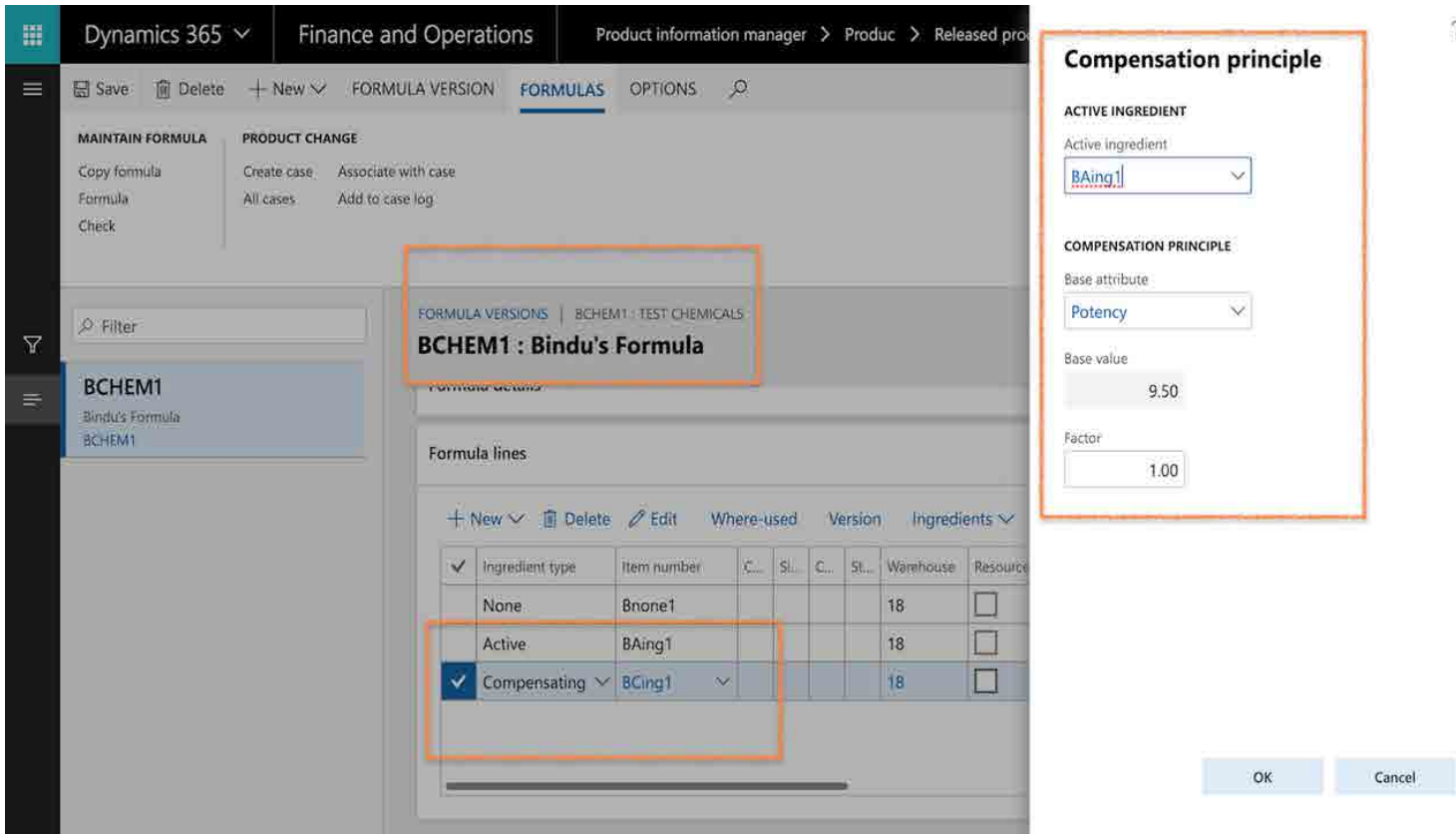


Fig 14. Compensation Principle Example



Batch orders created for the item in Fig. 14 (shown above) will have standard values proposed at the time of estimation. When the batch order is started and the appropriate active ingredient batch is picked with a specific potency, the batch balancing function in Microsoft Dynamics 365 provides the ability to balance the ingredients based on the compensating principle setup in the Formula.

Fig 15. Production Orders - Batch Order

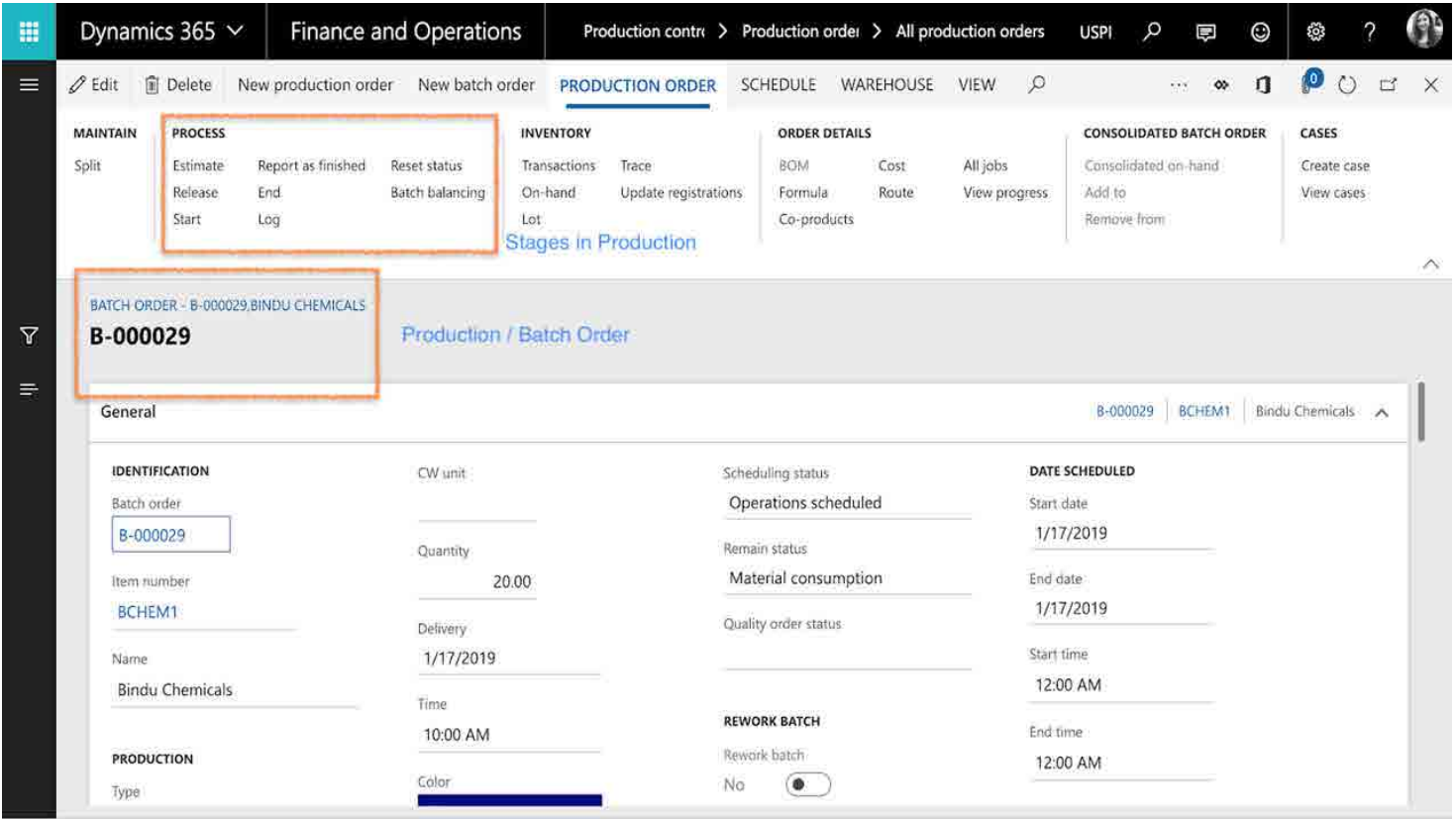
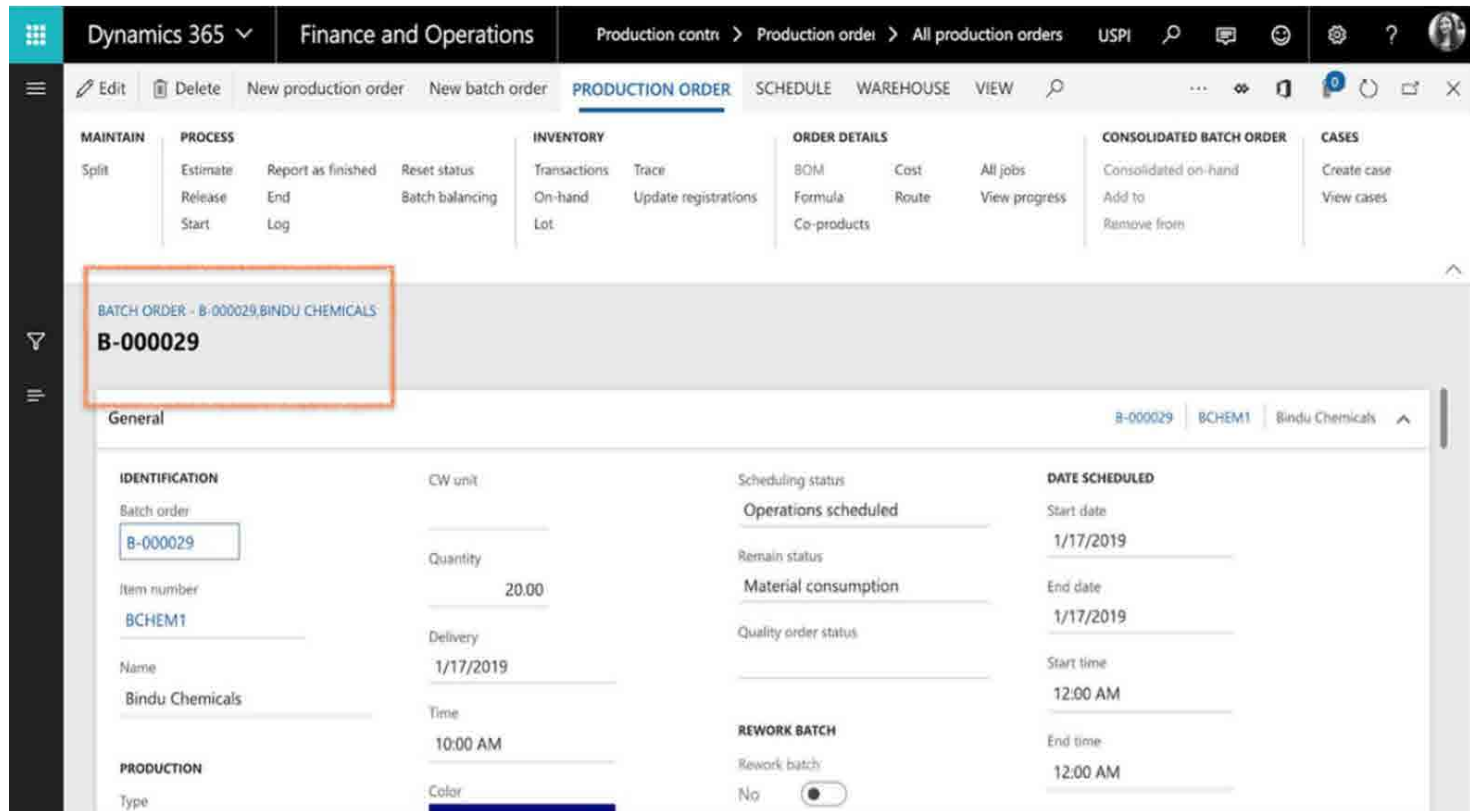


Fig 16. Production Orders - Batch Balancing (by confirming the formula, the balanced quantity is automatically selected to continue through the process)



ATTRIBUTE-BASED PRICING **FOR** **CUSTOMER** **BILLING**

Similar to purchasing, potency-based pricing can also be active during the sales process and within customer billing.

Using the same Caustic Soda example as above, if you sell a Caustic Soda tote, the calculation will auto-adjust billing based on the potency or purity selected. I will illustrate the Caustic Soda billing based on the purity of the batch consumed through the example below.

The Caustic Soda tote is created as a product in Microsoft Dynamics 365 with a specific purity of Na_2O as the base attribute. This includes an acceptable range of Na_2O purity and any other customer-specific requirement for the batch. The illustration of this example starts with assigning a batch attribute and a target value of the attribute. For Caustic Soda, we use batch attribute 'purity' of Na_2O . Microsoft Dynamics provides the ability to capture multiple attributes for an item, in this case the purity of Na_2O which is the active ingredient and the purity of Caustic Soda itself becomes relevant for pricing purposes.

ATTRIBUTE-BASED PRICING FOR CUSTOMER BILLING (CONTINUED...)

Fig 17. Batch Balancing

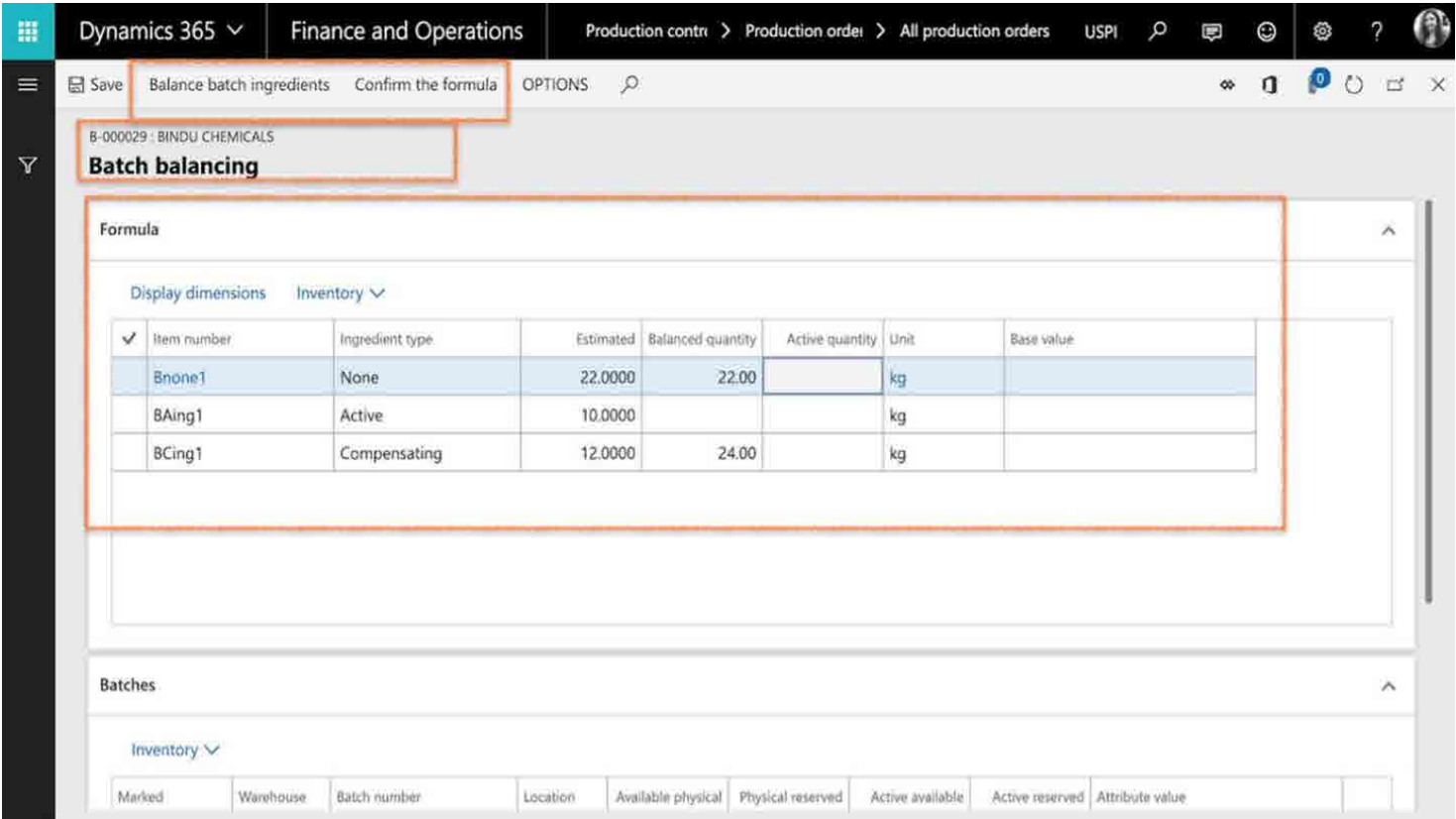
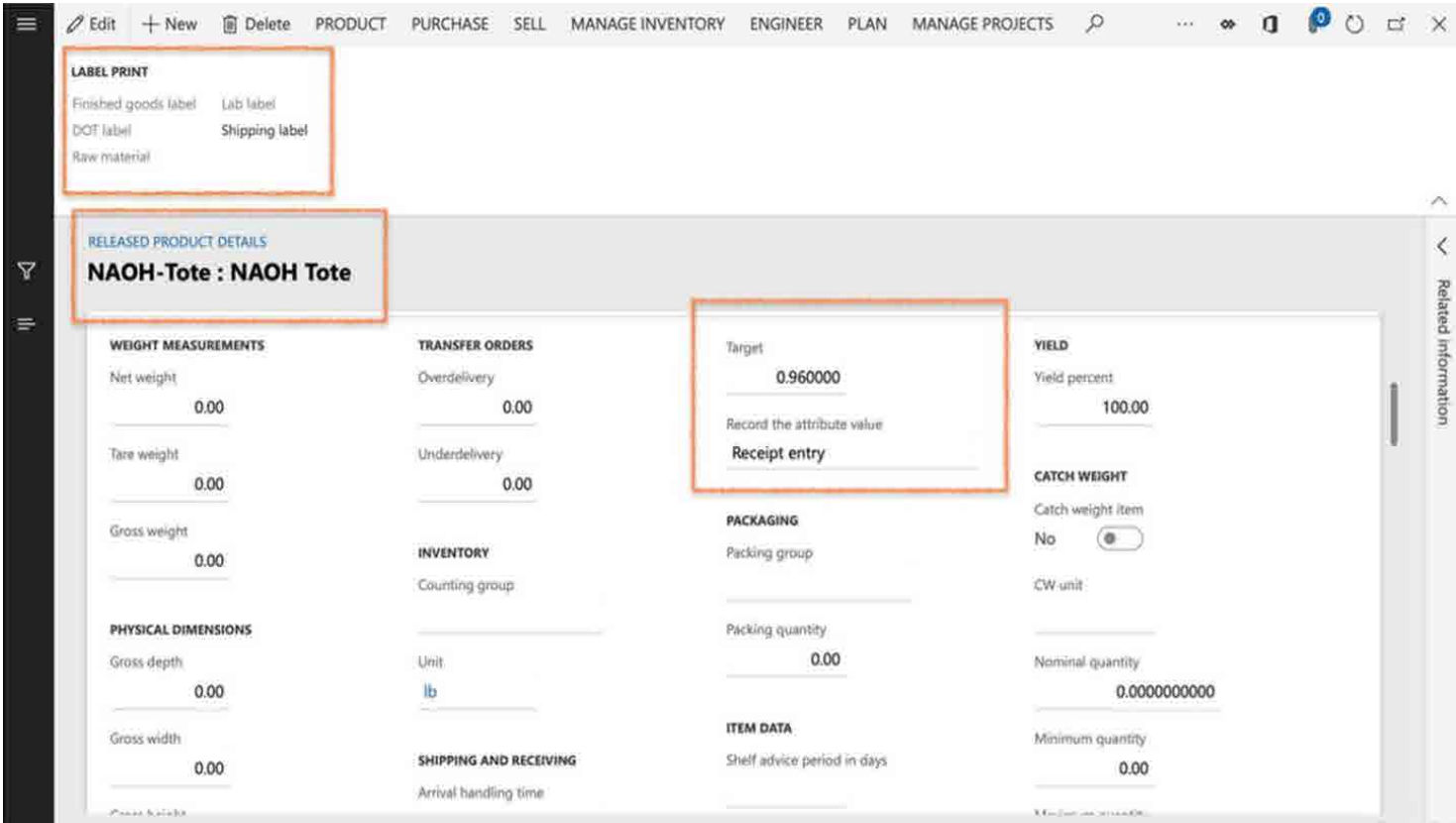
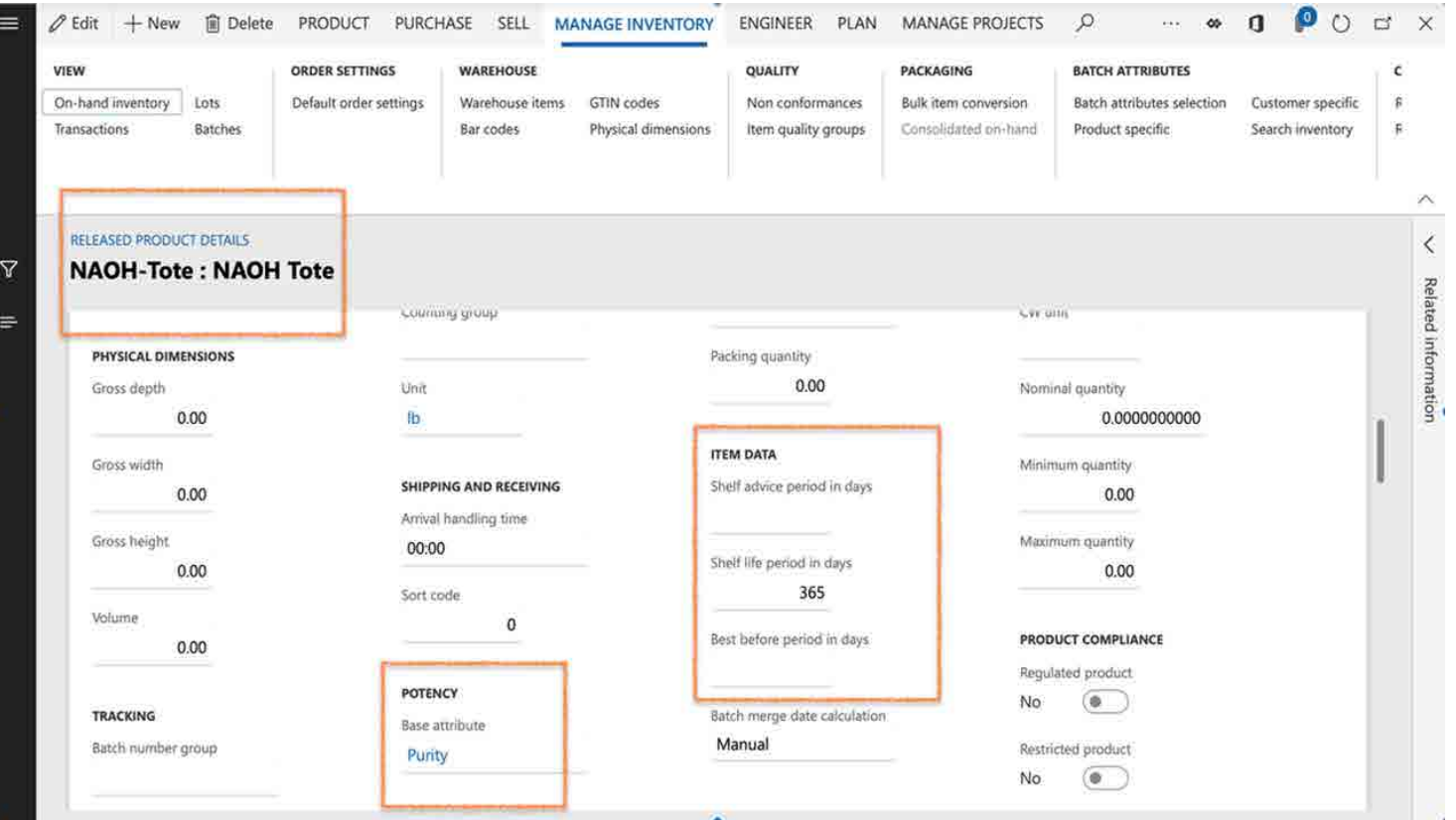


Fig 18. Released Product Details - Label Print Options



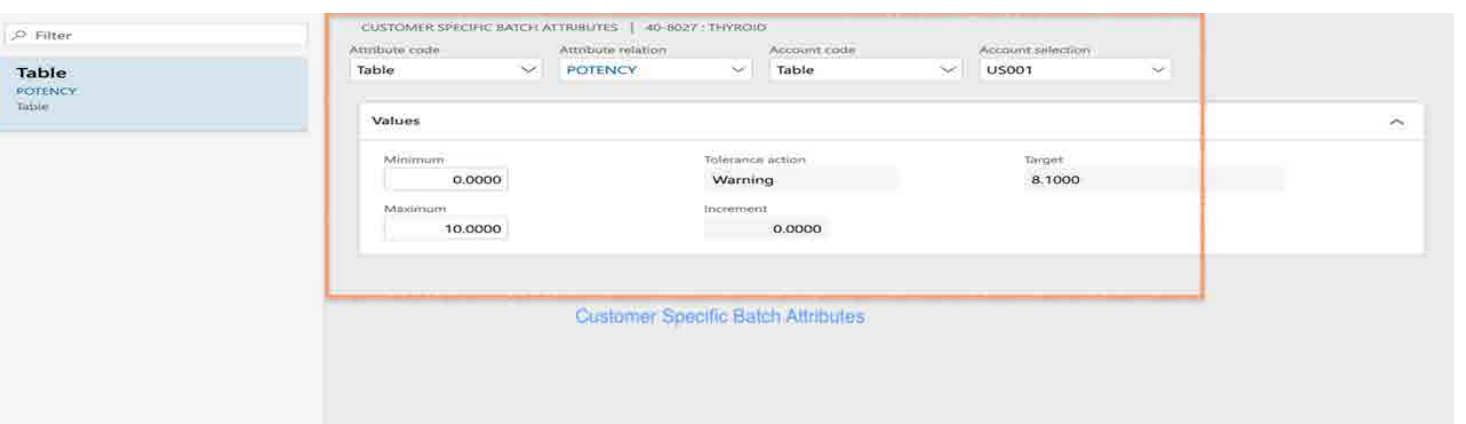
Microsoft Dynamics provides the ability to maintain product-specific as well as customer-specific batch attributes. For example, if your customer has additional potency requirements on the batch, over and above purity, the system provides the ability to maintain acceptable potency values for the batches that would be sold.

Fig 19. Released Product Details - Manage Inventory Tab Expanded



Product Information Management (PIM) in the system has the ability to maintain attribute-based pricing from trade agreements, which is a journal to maintain sales and purchase prices.

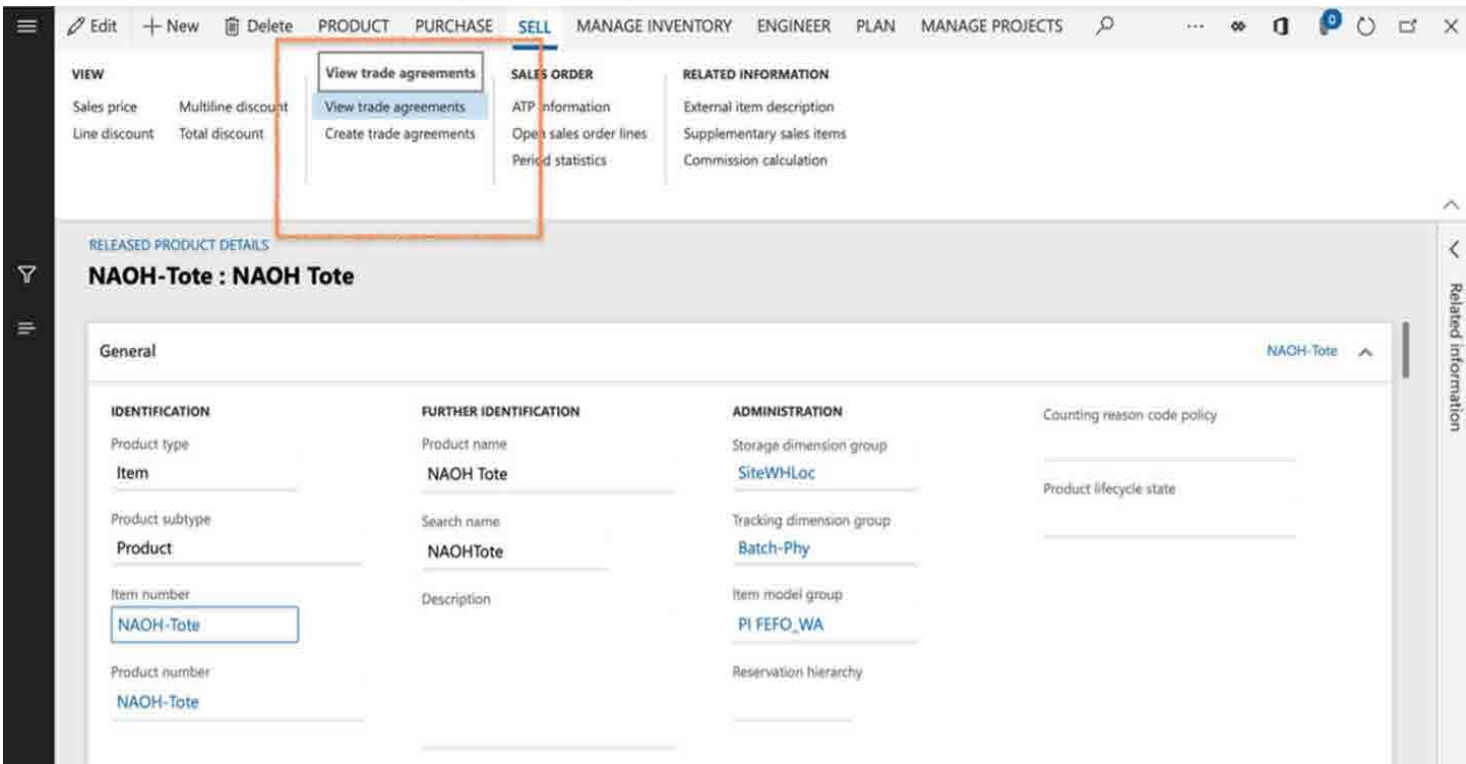
Fig 20. Customer Specific Batch Attributes



ATTRIBUTE-BASED PRICING FOR CUSTOMER BILLING (CONTINUED...)

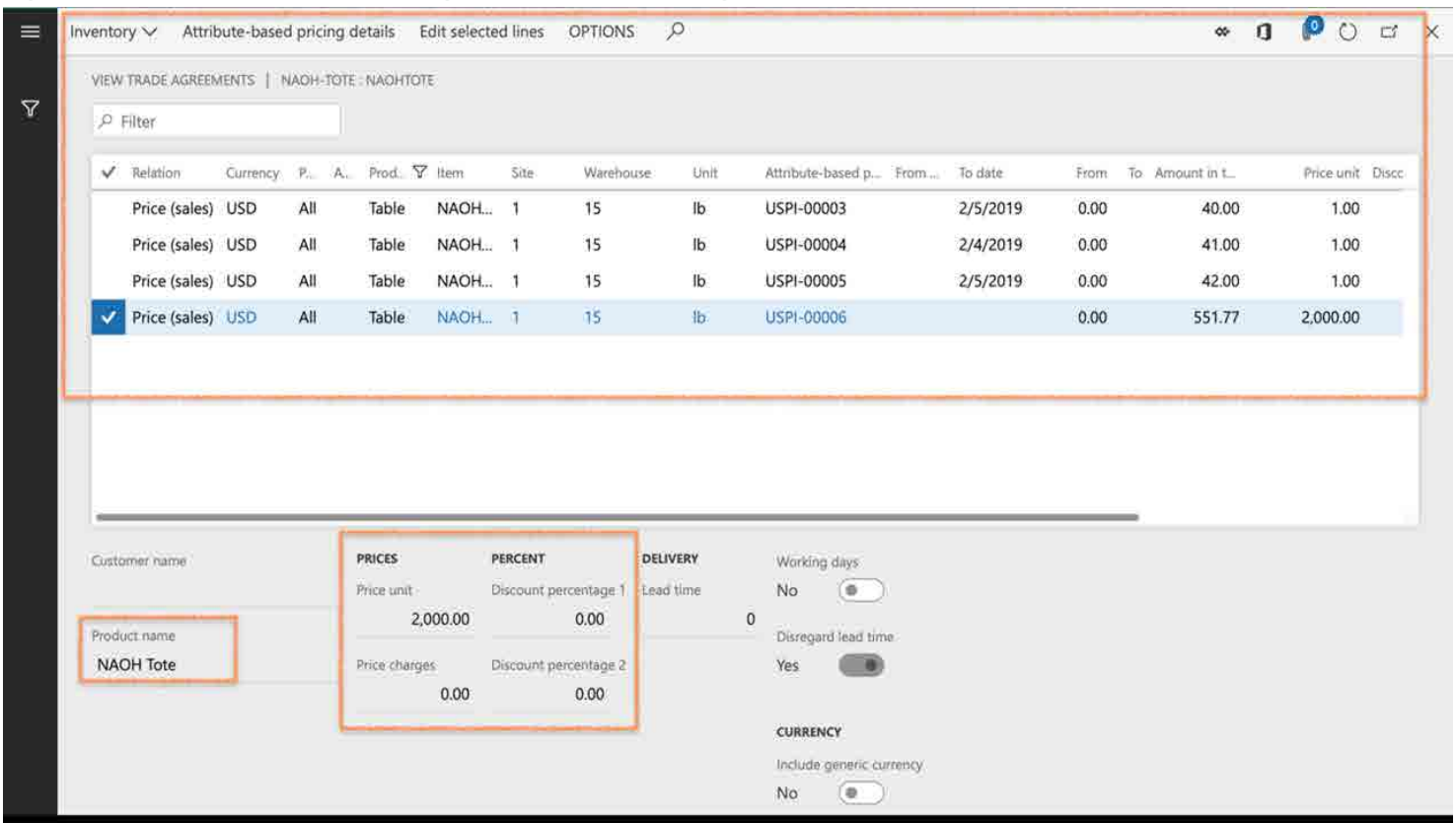
In the example shown in the screen below (Fig. 20), the sales price is maintained in pounds for an effectivity date that is tied to an attribute-based price calculation. This can include an algebraic equation that adjusts the price based on the purity or potency of the batch being sold.

Fig 21. Attribute-based Pricing - Trade Agreement for Sales Price



The figure below shows the calculation that includes the purity of Na₂O and Caustic soda if the price is dependant on both attributes.

Fig 22. Attribute-based Pricing Details - Trade Agreements



In this example, we demonstrate the use of a simple calculation based on actual purity and target values. The system would read the below calculation and, based on the actual value of the batch, automatically adjust the price on the customer's bill.

ATTRIBUTE-BASED PRICING FOR CUSTOMER BILLING (CONTINUED...)

Fig 23. Attribute-based Pricing

USPI-00006

ATTRIBUTE-BASED PRICING DATA

Attribute-based pricing ID Name Description

USPI-00006

Elements

Equation element	Equation element type	Attribute	Constant
B	Constant		1.50
C	Batch attribute - Actual	Purity	0.00
D	Batch attribute - Target	Purity	0.00
E	Unit price		0.00

Equation

Validate equation

Equation

(C/D)*E*B

The invoiced sales order below shows the adjusted price for the batch based on the purity of Caustic soda.

Fig 25. Sales Order with an Invoiced LinePrice

000644 : Cave Wholesales

Lines Header Invoiced

Sales order header

Sales order lines

Line status	Item number	Product name	Sales cat...	Quantity	Unit	Delivery type	Unit price	D...	D...	Net amount	Adjusted net a...	Qu
Invoiced	NAOH-Tote	NAOH Tote		45,160.00	lb	Stock	551.77			12,458.97	6,322.40	

Fig 24. Attribute-based Pricing

USPI-00005

ATTRIBUTE-BASED PRICING DATA

Attribute-based pricing ID Name Description

USPI-00005

Elements

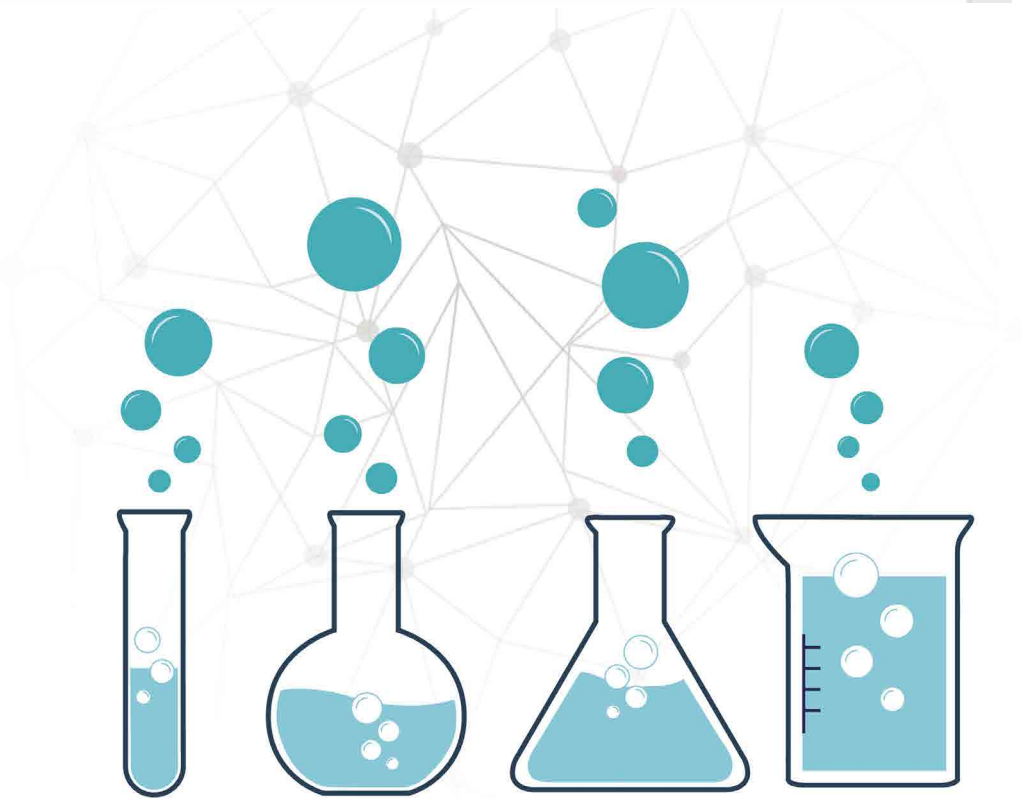
Equation element	Equation element type	Attribute	Constant
A	Unit price		0.00
B	Batch attribute - Actual	purity	0.00
C	Batch attribute - Target	purity	0.00
D	Batch attribute - Actual	NaOHpurity	0.00
E	Batch attribute - Target	NaOHpurity	0.00
F	Constant		10.00

Equation

Validate equation

Equation

((B/C)+(D/E))*A*F



KEY TAKEAWAYS

- Active Ingredient Management functionality in Microsoft Dynamics 365 distinguishes the “Active” content of the material from the other compensating or filler ingredients.
- This function ensures that a company gets paid for the active ingredient content it delivers to its customers and pays its vendors only for the active or potent content of the product.
- Microsoft Dynamics has the ability to proportionately adjust price on downstream transactions based on the quality test results captured on the Batch Attribute which determines the percentage of the Active Ingredient in the product.
- The system has the ability to track and maintain inventory based on the percentage of the Active Ingredient.
- Microsoft Dynamics 365 for Finance & Operations delivers powerful and comprehensive out-of-the-box functionality to support Active Ingredient and Potency Management that is critical to the process and other highly-regulated industries.

AUTHOR

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She has 20 years of hands-on experience in Finance, Costing and Manufacturing functions in conjunction with industry leading ERP systems like SAP, Microsoft Dynamics and building industry specific products. She has been an advocate of transformation through technology and a change agent helping companies grow by improving business processes & practices. If you have any questions or need help in anyway, you can reach out to the author at bindu@xcelpros.com or follow her on twitter [@BCtechnologist](https://twitter.com/BCtechnologist).

For more information or a demonstration of the subject-matter covered above, feel free to send me an email at bindu.chunduru@xcelpros.com.

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