ACTIVE INGREDIENT MANAGEMENT POTENCY-BASED PRICING IN MICROSOFT DYNAMICS 365

Dysposium

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THE CAUSTIC SODA EXAMPLE

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EXECUTIVE SUMMARY

- Active Ingredient Management and Potency-based Pricing are highly relevant to process manufacturing, distribution, and other manufacturing industries.
- -O The products in these industries consist of Active Ingredients, Compensating & Filler Ingredients (sometimes referred to as buffers, fillers and excipients).
- -O Active Ingredients and Potency have a significant impact on price variations in-turn affecting downstream functions such as customer billing and value.
- attributes such as potency, concentration and purity on items, inventory or batches.
- ——— The calculation of a potency-based price that is dependent on the percentage of active ingredient purity or potency can be achieved by maintaining an attribute-based price with algebraic equations.
- 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?**





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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 atleast 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.

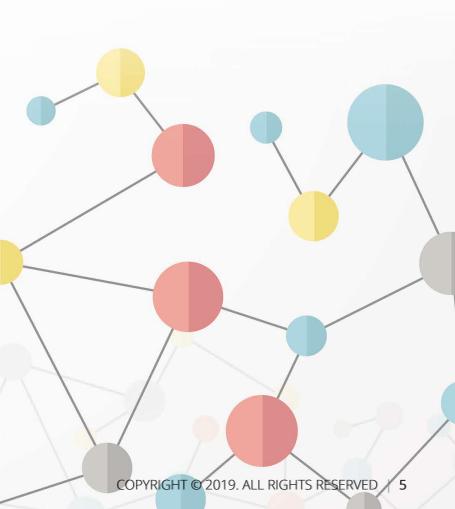
Chemical, Pharmaceutical, CPG and of late Cannabis industries will benefit most from this solution.

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.

INDUST

Chemical & Pharma

Food & Be

Steel / Met

Cannabis

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

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Fig 2. Released Product Details - Product Tab Expanded

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A few examples of batch attributes in different industries -

RY	EXAMPLE OF BATCH ATTRIBUTES
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	% of CBD % of THC Purity Contamination etc.

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ITEM BATCH ATTRIBUTES (CONTINUED...)

Fig 3. Released Products - Manage Inventory Tab Expanded

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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

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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.

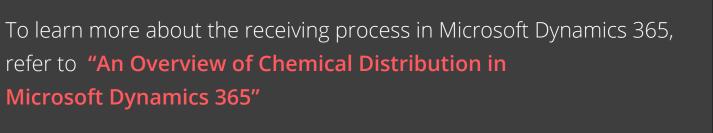
refer to "An Overview of Chemical Distribution in **Microsoft Dynamics 365"**

Fig 6. Attribute-based pricing details

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

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

Fig 8. Purchase Orders - Purchase Order Lines

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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)

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Fig 10. Released Products - Inventory Batch Attributes

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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

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Fig 12. Released Products - Formulas Details

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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.





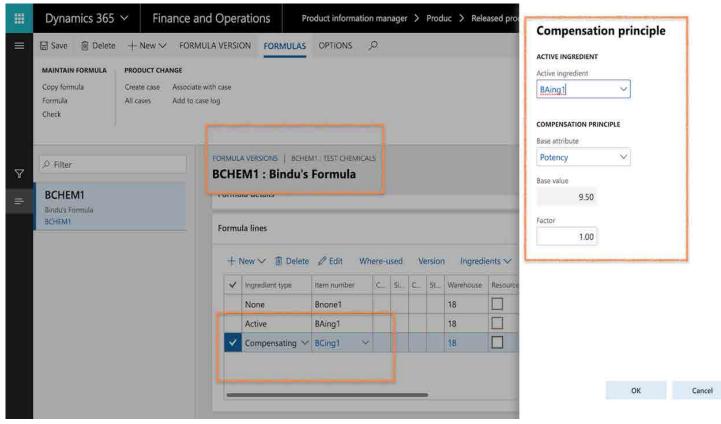
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Fig 13. Formula Lines - Compensating Principle

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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

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

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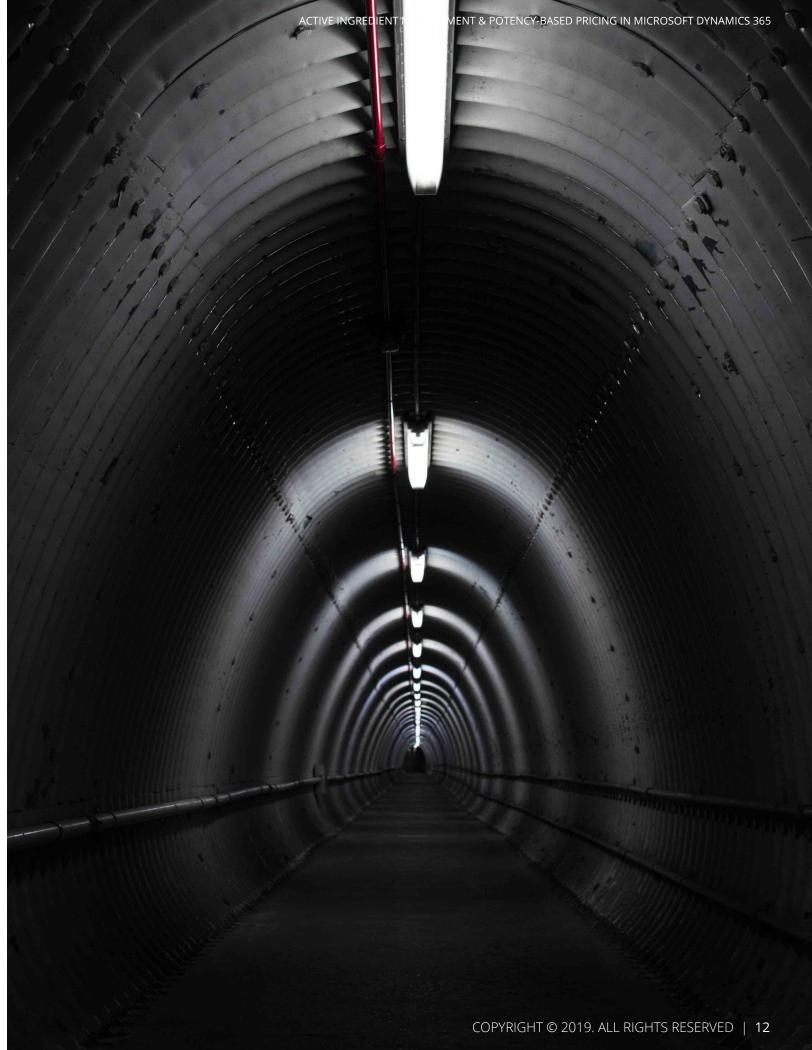
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ATTRIBUTE-BASED PRICING FOR CUSTOMER BILLING

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 Na₂O as the base attribute. This includes an acceptable range of Na₂O 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 Na₂O. Microsoft Dynamics provides the ability to capture multiple attributes for an item, in this case the purity of Na₂O 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

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Fig 18. Released Product Details - Label Print Options

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LABEL PRINT Finished goods label DOT label Shipping label Rave material						~
RELEASED PRODUCT DETAILS						<
WEIGHT MEASUREMENTS	TRANSFER ORDERS	Target	YIELD			Related information
Net weight	Overdelivery	0.960000	Vield percent			. orm
0.00	0.00		100.00			atio
		Record the attribute value				2
Tare weight	Underdelivery	Receipt entry				-
0.00	0.00	L	CATCH WEIGHT			
Gross weight		PACKAGING	Catch weight item			
0.00	INVENTORY	Packing group	No			
	Counting group		CW-unit			
PHYSICAL DIMENSIONS		Packing quantity				
Gross depth	Unit	0.00	Nominal quantity			
0.00	lb		0.000000000			
Gross width		ITEM DATA	Minimum quantity			
0.00	SHIPPING AND RECEIVING	Shelf advice period in days	0.00			
	Arrival handling time		0.00			
Para kalaba			X.Co. [

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

'Edit 十 New 🗊 Delete PRC	DOUCT PURCHASE SELL MANAG	E INVENTORY ENGINEER PLAN	MANAGE PROJECTS , O ··· •	0 👂 0 🖻
	the composition of the constraint of the constra	QUALITY N codes Non conformances sical dimensions Item quality groups	PACKAGING BATCH ATTRIBUTES Bulk item conversion Batch attributes selection Consolidated on-hand Product specific	Customer specific & Search inventory F
RELEASED PRODUCT DETAILS NAOH-Tote : NAOH Toto	e .comming group			
PHYSICAL DIMENSIONS		Packing quantity		
Gross depth 0.00	Unit	0.00	Nominal quantity 0.0000000000	
Gross width 0.00	SHIPPING AND RECEIVING	ITEM DATA Shelf advice period in days	Minimum quantity 0.00	1
Gross height.	Arrival handling time 00:00	Shelf life period in days	Maximum quantity 0.00	
Volume 0.00	Sort code	365 Best before period in days	PRODUCT COMPLIANCE	
TRACKING	POTENCY Base attribute	Batch merge date calculation Manual	Regulated product No Restricted product	

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

ble	Attribute code Table	\sim	Attribute relation	~	Account code Table	\sim	Account selection	
ENCY	Table		POTENCE		lable		03001	
	Values							à
	Minimum			Tolerano	e action		Target	
	0.	0000		Warni	ng		8.1000	
	Maximum			Incremen	al.			
	10.	0000			0.0000			
			Customer S	oecific Ba	tch Attributes			

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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

VIEW	View trade agreements SALES ORDER	RELATED INFORMATION			
Sales price Multiline discount	View trade agreements ATP information	External item description			
Line discount Total discount	Create trade agreements Open sales order lin	supplementary sales items			
	Period statistics	Commission calculation			
RELEASED PRODUCT DETAILS					
NAOH-Tote : NAOH T	ote				
General			(b2	ACH-Tote	
IDENTIFICATION	FURTHER IDENTIFICATION	ADMINISTRATION	Counting reason code policy		
Product type	Product name	Storage dimension group			
Item	NAOH Tote	SiteWHLoc	Product lifecycle state		
Product subtype	Search name	Tracking dimension group			
Product	NAOHTote	Batch-Phy			
	Description	item model group			
Item number		PI FEFO_WA			
Item number NAOH-Tote		A CONTRACTOR OF			
		Reservation hierarchy			

nve	ntor	ry 🗸 Attrib	oute-based	pricir	g details	Edit select	ed lines	OPTIONS	Q				*	0 👂	0 0
÷ÿ	'IEW'	TRADE AGREEN	RENTS N	AOH-1	DTE : NAOH	TOTE									
	P Filter														
	v	Relation	Currency	P	A. Prod.	🛛 Item	Site	Warehouse	Unit	Attribute-based p From	To date	From	To Amount in t_	Price	unit Disco
		Price (sales)	USD	All	Table	NAOH	1	15	lb	USPI-00003	2/5/2019	0.00	40.00	ា	.00
		Price (sales)	USD	All	Table	NAOH.	Ĵ.	15	lb	USPI-00004	2/4/2019	0.00	41.00	1	.00
		Price (sales)	USD	All	Table	NAOH	3	15	lb	USPI-00005	2/5/2019	0.00	42.00	1	.00
	~	Price (sales)	USD	All	Table	NAOH.	à	15	lb	USPI-00006		0.00	551.77	2,000	.00
	iustor	mer name			PRICES		PERCENT	DEL	JVERY	Working days			_		
c	ustor	mer name			PRICES Phice uni	t -		ercentage 1 Lea	d time	No 💿			_		
P	rodu	mer name ict name DH Tote]			t 2,000.00	Discount p		d time				_		

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.

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



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

USPI-00006	Attribute-based pricing ID N USPI-00006 Elements + Add variable		Description					
		Remove variable			٦			-
	✓ Equation element	Equation element type	Attribute	Constant				
	В	Constant		1.50				
	c	Batch attribute - Actual	Purity	0.00				
	D	Batch attribute - Target	Purity	0.00	1			
	Ε	Unit price V						
	Equation					(C/D)	E*B 🗡	
	Validate equation							
	Equation							- 11

Fig 24. Attribute-based Pricing

Filter SPI-00005	ATTRIBUTE-BASED PRICIN Attribute-based pricing ID USPI-00005 Elements		Description			
	+ Add variable	Remove variable				
	✓ Equation eleme	ent Equation element type	Attribute	Constant		
	A	Unit price		0.00		
	В	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		
	Équation				((B/C)+(i	D/E))*A*F
	Validate equatio	n				
	Equation					

Caustic soda.

Fig 25. Sales Order with an Invoiced LinePrice

🖉 Edit	$+\mathrm{New}$	I Delete	SALES ORDER	SELL MANAG	E PICK AND P	PACK
LABEL PR Finished DOT labe Shipping	goods label I	Raw material Lab label				
000	ORDER DETA 644 : Ca es order hea	ve Whole	esales			
Sal	es order line	25				
	+ Add line	+ Add lines	Add products	Remove	Sales order line	e∨
3	🗸 T V	Line status	Item number	Product nam	e Sales cat.	Qu
		Invoiced	NAOH-Tote	NAOH Tote	N	45,16
L						



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

INVOICE	RETAIL	GENERAL	WAREHOUSE	Q		« ()	P	0	С	>
			Li	nes Hea	ader I	nvoice	d			2
			Product and sup		Update lii				1	
itity Unit	Deliver Stock		Unit price D		Net amoun 12,458.97		6,322.4			Į
X										
			X							
J		K	5	7	7		0	0		7
	0		100	5-1		IF		\sim		

KEY TAKEAWAYS

- -O Active Ingredient Management functionality in Microsoft Dynamics 365 distinguishes the "Active" content of the material from the other compensating or filler ingredients.
- content it delivers to its customers and pays its vendors only for the active or potent content of the product.
- downstream transactions based on the quality test results captured on the Batch Attribute which determines the percentage of the Active Ingredient in the product.
 - $-\bigcirc$ 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

Bindu Chunduru

CO-FOUNDER & HEAD OF DELIVERY

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.

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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