

*PREPACKAGED  
MATERIALS  
FOR  
STUDENT  
ANALYTICAL  
CHEMISTRY*



*QUANTITATIVE AND  
QUALITATIVE UNKNOWNNS*

*2010-2011 CATALOG*

*THORN SMITH  
LABORATORIES*

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## THE THORN SMITH TRADITION

It was in 1909 that Thorn Smith, Professor of Analytical Chemistry, responded to urgent requests to produce unknown samples for his colleagues at the Michigan Agricultural College (now Michigan State University). Before long, his reputation for precision and honest value had him working evenings and weekends in his basement laboratory to produce enough samples for a growing number of colleges and universities throughout the United States.

Soon production facilities were established in Detroit where Professor Smith's unique and highly exacting standards together with many secret control, testing and mixing techniques combined to produce over a thousand unknowns of unsurpassed uniformity and quality. These standards have been scrupulously maintained and refined for over 90 years, and are the principle reason why Thorn Smith Laboratories is the leading supplier of analyzed materials for colleges and universities throughout the world.

With the present day trend to teach more theory in many labs, there has emerged greater demand for "simple" materials, rather than the ordinary or "commercial" products for teaching bench techniques as in earlier days. Formerly, so many complications arose in the use of commercial materials that the theory was obscured by the effort to reach a solution.

The high purity and predictable results of Thorn Smith analyzed materials has made their use in college and university labs a standard for consistently effective teaching and testing.

Professors and students find the convenience of Thorn Smith quantitative

unknowns both satisfying and effective because they are working with materials that are uniform, precisely analyzed, specifically designed and manufactured for their use.

### Positive Results

Now more than ever professors need and use Thorn Smith Quantitative and Qualitative Unknowns and Student Reference Standards. Why? Because they are cost effective, reliable and trouble free due to over 90 years of experience.

Professors specify and use Thorn Smith products because they know we are concerned about their students and supply products that are tested and proven. The idea behind Thorn Smith products is to help educate the students through learning by observing positive results, not trickery. Good learning results come from products that are carefully prepared, analyzed, and quality tested. Today, more so than in the past, professors have precious little time to make their own unknowns, let alone test them and be assured of their fairness to students. Our longevity in business is due to careful product preparation, upgrading of mixes, and a continuing effort to produce the best possible products.

### Why Use Thorn Smith Materials?

**First is "selection".** By careful comparison of the many available raw materials, Thorn Smith carefully selects materials which are **stable** – as to air oxidation or reduction; as to interaction of components; as to taking up water in high humidity conditions or losing water in dry conditions (every component is checked by exposure to 100% and 0% humidity); as to physical problems such as caking

(though this is very difficult to avoid with some materials). In addition, selection is governed by mixability and separation tendency.

Thus, selecting components for unknowns is half science and half art – and it is extremely important in the quality of the final product. This expertise comes only from decades of experience at Thorn Smith.

**Second is "processing".** Most raw materials have to be pulverized, classified (by sifting), and mixed by various methods. In addition, time of mixing is sometimes critical since some combinations of raw materials actually "de-mix" when mixed for long durations. Or some particles can build up an electrostatic charge or be worn down so small that they become air suspensions which settle out as a layer on top of a mix when the mixer is stopped. Therefore, like selection, the processing of raw materials is again about half science and half art - both of which are heavily dependent on years of experience.

**Third is "analysis".** Almost all of Thorn Smith's materials are sampled and analyzed using several different methods, to make sure that the unknown is suitable for a variety of analytical techniques. In some cases, the raw materials must be changed. For example, in preparing soluble sulfates unknowns, sodium sulfate, potassium chloride, and several other possibilities exist for active materials and diluents. Final student accuracy will depend not only on the care and method of analysis, but also on the amount of coprecipitation of the sodium, potassium, and chloride ions. Each year, many hours of literature and laboratory research are spent on these unknowns alone.



Thorn Smith also runs over 100 analyses for each new unknown series of 25 varieties. Thus, the more varieties of a particular unknown required by our customers increases our analysis work because each variety is treated as its own entity.

In addition to the selection, processing, and analysis of the the unknowns, the preparation of quality unknowns requires many special techniques, including the addition of either "anti-slip" or "lubricant" materials. Of course all of these additives are judged by their effect on the analysis or several different analysis schemes.

### With Thorn Smith Unknowns, You Make The Difference

An extremely important factor in making decisions regarding selection, processing, and analysis are the reports from our customers. We are always looking for suggestions for improvement. Detailed notebooks are kept on every unknown, and every suggestion from the field is carefully considered and recorded. These suggestions lead to changes in our unknowns that make them more useful and easier to use. Thus, a great deal of thought, study, experience, and research goes into each unknown.

### Answer Sheets

Thorn Smith also supplies answer sheets on all of their unknowns which contain reliable and accurate results. This makes it easy for students to analyze some unknowns in several different ways to compare methodology and results.

To prevent students from accumulating answer files, a new series of answer sheets with new compositions are prepared every few years. It is not unusual for students to misrepresent themselves in an attempt to obtain answer sheets for unknowns. Therefore, we adhere to some very strict policies regarding the release of answer sheets.

- We only sell and ship student unknowns to academic institutions.
- Our answer sheets for student unknowns are protected by shipping

them in a specially sealed envelope to the professor ordering our products.

- We verify all requests for answer sheets before mailing them. There is a fee associated with all requests, please call for details.

This is part of the extra effort that we expend to protect the answer sheets from falling into the wrong hands, and part of the service you would expect from us when purchasing our products.

### Student Standards

Educators agree that students need "measuring sticks" to calibrate their equipment and volumetric standards. To give students reference standards of accuracy matching that of unknowns, Thorn Smith produces Student Reference Standards (see page 5). Side-by-side analysis of these standards with Thorn Smith unknowns gives agreement of a few parts per ten thousand for many materials. Matching these accuracies provides a real challenge to even your best students.

### Also Available...Dry Quals

Dry quals are available and by the way, here are a few reasons why you would want to incorporate these into your curriculum:

- **Instructor time saver** - Prepared individual samples eliminate the need to label and fill racks of test tubes for each analysis group.
- **Educational and easy to use** - Students have the opportunity to dissolve a solid and consider the fact that both cations and anions are present. The unknown solid needs just a

few seconds to dissolve and the sample is ready for analysis.

- **Reliable** - The raw materials are reagent grade. No inert fillers are added and no trace elements are present except those listed by the manufacturer. The sample size is between 0.37 - 0.40 g with approximate equal amounts by weight of each raw material. The exception is Ag<sup>+</sup> which is high purity and 0.25 - 0.30 g. The unknowns have a stable shelf life.
- **Reduced storage space** - Storage space needed for raw material bottles and the various known and unknown solutions may easily use several shelves in the storeroom. The small zip lock packets require little storage space.
- **Many contributions** - For each analysis group, there are several possible ion combinations. The packets containing the dry qualitative unknowns are light filtering to provide a uniform appearance and to disguise the various metal ion colors.
- **Control costs** - A fixed amount of material is provided to each student at a known cost. Students may be charged if an extra packet is required. Purchase only the number of unknowns needed.
- **Other uses** - Anions and cations may be studied by infrared spectroscopy, paper chromatography, ion exchange chromatography, and emission spectroscopy.





## Analyzed Quantitative Unknowns

A wide variety of readily available Thorn Smith Quantitative Unknowns include:

**Gravimetric unknowns** such as Soluble Chloride, Soluble Sulfate, Ferrous Ammonium Sulfate

**Oxidimetric unknowns** such as Soluble Oxalate, Arsenious Acid, and Ferrous Ammonium Sulfate

**Acidimetric unknowns** such as Acid Potassium Phthalate and Soda Ash

**Complexometric unknowns** such as Copper Oxide (particularly recommended), Calcium Carbonate and Magnesium Sulfate

**Other unknowns** such as Brass, Steel, Silver Alloys and numerous others.

## Varieties of Student Quantitative Unknowns (Series)

### What Is A Series?

Most batches of active materials are divided into as many as 25 lots. These lots are then carefully measured and portioned with the differing percents of inactive ingredients. This procedure is what is referred to as a series of student unknowns. For example, iron oxide is produced in a series of 25 unknowns with each lot carefully prepared, analyzed, recorded and then inventoried.

### Filling Orders For Series

It is our policy to send one of each series when filling your order. If you order 18 student unknowns of iron oxide, you should receive 18 varieties depending on availability and balancing of our inventories. At certain times we may even have more (sometimes we may have more; sometimes less) than the 25 listed varieties, due to residual inventories from previous series after a new series is produced. In these cases, if you should order 33 iron oxide student unknowns, it is conceivable that you will receive 33 varieties without duplicates. This kind of service to you is automatic without your need of requesting it. In any case, please call to verify quantities.

## Student Reference Standards and Reagent Chemicals

Educators agree that students need “measuring sticks” to calibrate their equipment and volumetric standards. U.S. Bureau of Standards reference standards are excellent but very expensive. Some commercial “standards” are satisfactory, but others are not. To give students reference standards of accuracy matching that of unknowns, Thorn Smith produces Student Reference Standards. Side-by-side analysis of these standards with Thorn Smith unknowns gives agreement of a few parts per ten thousand for many materials. Matching these accuracies provides a real challenge to even your best students.

### Lot Specification

Our standard practice is to provide a variety of percentages when filling unknown orders. When the requester places an order, we automatically send a variety of lots. We do not duplicate lots unless it is specifically requested by the buyer, or availability is such that we cannot give all separate lots.

When the requester asks for specific lots it depletes our inventory unevenly. We can accommodate requested lots *only* if they are available. There is a Lot Specification Charge added to each order for each lot being requested. This charge is \$2.00 per lot specified.

### Poison Packs

Silver nitrate, potassium dichromate and arsenic must be shipped in poison packs. The small size accommodates one 500 gram bottle or several student vials and 100 gram containers (allowances must be made for cushioning around each vial). The large size poison pack holds four (4) 500 gram containers. Call for quotations as shipping prices are subject to change.

## WARNING

Some of the chemicals listed in this catalog are toxic. Some are highly toxic, such as arsenic, or are suspected carcinogens, such as Potassium Dichromate. **Therefore, extreme care must be used at all times when handling or using any of these products.** Only trained chemists should supervise students in the proper use and handling of these products, including the qualitative unknowns.

### Accessory Products: INDI TABS Chemical Indicator Tablets Kits

INDI-TABS provide a simple and economical way to add indicators to your titration flask. Each tablet contains 0.01 gram of active ingredient mixed with a binder of sodium chloride, potassium nitrate, or potassium chloride. Simply add one or more INDI-TABS to your solution, eliminating time-consuming weighing and clean-up. One INDI-TAB usually is sufficient for each 100 ml of solution. The tablets dissolve rapidly, but the process can be accelerated by crushing the tablet with a stirring rod.

INDI-TAB Kits provide the convenience of immediate availability of a series of different indicators; each kit provides 100 tablets of each of the twelve different indicators. Thus there is no need to purchase expensive bulk lots of indicators to have on hand for those few times they may be needed. However, for those researchers who use a particular indicator frequently, Thorn Smith supplies each INDI-TAB in bulk containers of 1,000 tablets.

### Magnetic Stirrer (non-electric)

This non-electric plastic magnetic stirrer is simple and safe to use as a student/teacher laboratory aid. It can be used separately or in a series. Since it runs on compressed air, vacuum, or tap water, it is ideal for immersion in a water bath or even in a flammable atmosphere.



## ANALYZED QUANTITATIVE UNKNOWNNS

(Please verify availability before ordering specific lot numbers)

## STUDENT REFERENCE STANDARDS AND REAGENT CHEMICALS

Catalog Number	# of Lots Avail. (Approx.)	Material	Unit Price		
			Student Qty	100 Vial Qty	Ext.
-	-	Acid potassium phthalate (see Potassium biphthalate)			
80-1010	4	Aluminum-magnesium alloy for Al, Mg (also known as Dow Metal)	\$2.99	\$21.50	
80-1020	3	Aluminum-zinc alloy for Al, Zn	2.99	21.50	
80-1045	25	Antimony ore for Sb	2.20	16.25	
80-1055	20	Arsenic - <b>Highly toxic; shipped in Poison Packs*</b>	1.99	14.25	
80-1070	11	Brass "A" for Sn, Pb, Cu, Zn	3.10	22.25	
80-1080	1	Brass "B" for Sn, Cu, Zn	2.85	20.50	
80-1085	1	Brass "C" for Cu, Pb, Zn	2.85	20.50	
80-1090	1	Brass "D" for Cu, Zn	2.85	20.50	
80-1115	25	Calcium carbonate for CaO	2.90	21.25	
80-1135	6	Cast iron for P, Mn, S, Si, C (total and graphitic)	2.85	20.50	
80-1150	6	Cement for SiO <sub>2</sub> , Fe <sub>2</sub> O <sub>3</sub> , Al <sub>2</sub> O <sub>3</sub> , CaO, MgO, SO <sub>3</sub> , loss on ignition	2.85	20.50	
80-1175	24	Chromium ore for Cr	2.70	19.75	
80-1200	10	Copper ore for Cu	2.15	15.50	
80-1230	25	Copper oxide (easily soluble in acid) for Cu	2.30	17.30	
80-1260	25	Ferrous ammonium sulfate for Fe	4.05	27.05	
80-1275	11	Iron ore (natural) for Fe	2.60	18.50	
80-1300	20	Iron oxide for Fe (easily soluble in acid)	2.60	19.75	
80-1320	15	Limestone for CaO, MgO, SiO <sub>2</sub> , R <sub>2</sub> O <sub>3</sub>	2.85	20.50	
80-1355	10	Magnesium sulfate for MgO	2.05	15.25	
80-1370	22	Manganese ore for Mn and O	2.10	15.25	
80-1375	1	Monel metal for Si, Cu, Ni	3.40	24.75	
80-1385	6	Nickel silver for Cu, Ni, Zn (also known as German Silver)	3.40	24.75	
80-1395	10	Nickel oxide for Ni	2.95	21.50	
80-1425	20	Phosphate rock for P <sub>2</sub> O <sub>5</sub>	2.20	16.25	
80-1475	25	Potassium biphthalate for acidity	4.05	27.05	
80-1485	1	Silver alloy "E" for Ag, Cu, Zn and Ni	9.20	N/A	
80-1487	3	Silver alloy GL for Ag only (10 to 30% Ag)	4.65	N/A	
80-1488	2	Silver alloy GM for Ag only (50 to 60% Ag)	6.75	N/A	
80-1489	1	Silver alloy GH for Ag only (85 to 95% Ag)	9.75	N/A	
80-1510	25	Soda ash for Na <sub>2</sub> CO <sub>3</sub>	3.15	22.95	
80-1545	15	Soluble antimony (Tartar Emetic) for Sb	2.05	15.25	
80-1575	25	Soluble chloride for Cl	2.70	20.75	
80-1600	25	Soluble oxalate for Na <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	2.65	18.95	
80-1650	20	Soluble phosphate for P <sub>2</sub> O <sub>5</sub>	2.70	19.50	
80-1675	17	Soluble sulfate for SO <sub>3</sub>	3.10	21.75	
80-1680	4	Steel "A" for C, Mn, P, S, Si	2.75	19.50	
80-1685	2	Steel "G" Stainless for Ni, Cr, Si	3.00	21.50	
80-1700	4	Steel "H" for C, Mn, P, S, Si, Ni, Mo	3.05	22.55	
80-1715	10	Zinc ore for Zn	2.50	18.00	
<b>Sub-Total \$</b>					

Catalog Number	Material	Unit Price		
		Qty	100 gram Qty	500 gram Qty
-	Acid potassium phthalate (see Potassium biphthalate)			
81-1010	Arsenious acid - for standardizing iodine <b>Highly toxic; shipped in Poison Packs*</b>	\$ 11.70	\$ 46.50	
81-1020	Calcium carbonate - for standardizing EDTA solution	11.50	44.75	
81-1035	Ferrous ammonium sulfate - for standardizing dichromate or permanganate solution	11.75	45.95	
81-1045	Potassium biphthalate - for standardizing sodium hydroxide solution	15.00	55.00	
81-1055	Potassium dichromate - for standardizing thiosulfate solution <b>Shipped in Poison Packs*</b>	10.70	41.50	
81-1060	Silver nitrate ACS grade <b>Shipped in Poison Packs*</b> <b>Note:</b> Prices may vary due to silver market and may vary due to change in poison packaging charges. Phone for quotations on amounts over 500 grams.	165.00	410.00	
81-1075	Sodium carbonate - for standardizing acid solution	9.95	38.50	
81-1085	Sodium chloride - for standardizing silver nitrate solution	9.45	36.50	
81-1090	Sodium oxalate - for standardizing permanganate solution	11.70	46.50	

## MEASURED SOLUTIONS QUALITATIVE UNKNOWNNS

(each vial dilutes to make 50 ml unknown solution) At least 10 lots available in each Set, number of lots may vary per Set		Qty	Unit Price	Ext.
82-1010	<b>Set I</b> Ag <sup>+</sup> ; Ag(NH <sub>3</sub> ) <sub>2</sub> <sup>+</sup> ; Pb <sup>2+</sup> ; Hg <sup>+</sup>		\$ 4.35	
82-1015	<b>Set II</b> Hg <sup>2+</sup> ; Pb <sup>2+</sup> ; Cu <sup>2+</sup> ; Cu(NH <sub>3</sub> ) <sub>2</sub> <sup>2+</sup> ; Bi <sup>3+</sup> ; Cd <sup>2+</sup> ; Cd(NH <sub>3</sub> ) <sub>2</sub> <sup>2+</sup>		4.35	
82-1020	<b>Set III</b> AsO <sub>4</sub> <sup>-3</sup> ; AsO <sub>2</sub> <sup>-</sup> ; Sn <sup>2+</sup> ; Sn <sup>4+</sup> ; Sb <sup>3+</sup>		4.35	
82-1025	<b>Set IV</b> Combined cations of Sets II and III		5.50	
82-1030	<b>Set V</b> Fe <sup>3+</sup> ; Fe <sup>2+</sup> ; Al <sup>3+</sup> ; AlO <sub>2</sub> <sup>-</sup> ; Cr <sup>3+</sup> ; CrO <sub>4</sub> <sup>-2</sup> ; Mn <sup>2+</sup> ; Ni <sup>2+</sup> ; Ni(NH <sub>3</sub> ) <sub>4</sub> <sup>2+</sup> ; CO <sup>2+</sup> ; Zn <sup>2+</sup> ; Zn(NH <sub>3</sub> ) <sub>4</sub> <sup>2+</sup> ; ZnO <sub>2</sub>		4.35	
82-1040	<b>Set VI</b> Ba <sup>2+</sup> ; Ca <sup>2+</sup> ; Sr <sup>2+</sup>		4.35	
82-1045	<b>Set VII</b> Na <sup>+</sup> ; K <sup>+</sup> ; NH <sub>4</sub> <sup>+</sup> ; Mg <sup>2+</sup>		4.35	
82-1090	<b>Set XVII</b> Combined cations from Sets VI and VII		5.50	
<b>Sub-Total \$</b>				

Cations are supplied in small, medium, and large concentrations (assorted) to give students estimation practice. Since some qualitative solutions have limited shelf life, many are prepared to order. Please allow 30 days for delivery.

\*Shipped in Poison Packs at extra charge (see page 4);  
N/A signifies No Longer Available.

**A Student Vial contains approximately 10 grams of unknown.**



Catalog Number	Material	Price	Qty
82-1100	<b>Group I</b>		
	Ag	\$1.55	
	Pb	1.55	
	Hg <sup>2+</sup>	1.55	
	Ag Pb	1.55	
	Pb Hg <sup>2+</sup>	1.55	
82-1110	<b>Group II</b>		
	Pb Cu Sn	1.45	
	Hg <sup>2+</sup> Cu	1.45	
	Pb Bi Sb	1.45	
	Cu Sb Sn	1.45	
	Hg <sup>2+</sup> Pb Bi Sb Sn	1.45	
	Hg <sup>2+</sup> Pb Bi Cu Sn	1.45	
	Hg <sup>2+</sup> Bi Cu Sb	1.45	
	Pb Cu Sb	1.45	
	Hg <sup>2+</sup> Pb Cu Sb	1.45	
	Pb Bi Cu	1.45	
	Hg <sup>2+</sup> Bi Cu Sn	1.45	
82-1120	<b>Group III</b>		
	Al Fe Zn	1.45	
	Cr Fe Mn	1.45	
	Al Mn Zn	1.45	
	Cr Mn Zn	1.45	
	Al Fe Mn	1.45	
	Cr Fe Zn	1.45	
	Al Fe Mn Zn	1.45	
	Cr Fe Mn Zn	1.45	
	Fe Mn	1.45	
	Al Cr Fe Mn Zn	1.45	
	Fe Zn	1.45	
	Mn Zn	1.45	
82-1130	<b>Group IV</b>		
	Ba	1.45	
	Ca	1.45	
	Sr	1.45	
	Ba Ca	1.45	
	Ba Sr	1.45	
	Ca Sr	1.45	
	Ba Ca Sr	1.45	
82-1140	<b>Group V</b>		
	NH <sub>4</sub>	1.45	
	Mg	1.45	
	K	1.45	
	Na	1.45	
	NH <sub>4</sub> Mg	1.45	
	Mg K	1.45	
	NH <sub>4</sub> Na	1.45	
	NH <sub>4</sub> Mg K	1.45	
	NH <sub>4</sub> Mg Na	1.45	
		<b>Qty Sub-Total</b>	

Catalog Number	Material	Price	Qty
82-1300	<b>Anions</b>		
	SO <sub>4</sub> <sup>2-</sup>	\$1.45	
	Cl <sup>-</sup>	1.45	
	S <sup>2-</sup>	1.45	
	Br <sup>-</sup>	1.45	
	PO <sub>4</sub> <sup>3-</sup>	1.45	
	I <sup>-</sup>	1.45	
	CO <sub>3</sub> <sup>2-</sup>	1.45	
	NO <sub>3</sub> <sup>-</sup>	1.45	
	SO <sub>3</sub> <sup>2-</sup> SO <sub>4</sub> <sup>2-</sup>	1.45	
	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup>	1.45	
	NO <sub>3</sub> <sup>-</sup> SO <sub>4</sub> <sup>2-</sup>	1.45	
	PO <sub>4</sub> <sup>3-</sup> Cl <sup>-</sup>	1.45	
	S <sup>2-</sup> Br <sup>-</sup> 82-1	1.45	
	I <sup>-</sup> C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup>	1.45	
	CO <sub>3</sub> <sup>2-</sup> Cl <sup>-</sup>	1.45	
	PO <sub>4</sub> <sup>3-</sup> SO <sub>4</sub> <sup>2-</sup>	1.45	
	SO <sub>4</sub> <sup>2-</sup> Br <sup>-</sup>	1.45	
C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> PO <sub>4</sub> <sup>3-</sup>	1.45		
Cl <sup>-</sup> SO <sub>4</sub> <sup>2-</sup> CO <sub>3</sub> <sup>2-</sup>	1.45		
SO <sub>3</sub> <sup>2-</sup> SO <sub>4</sub> <sup>2-</sup> NO <sub>3</sub> <sup>-</sup>	1.45		
82-1200	<b>General Unknowns</b>		
	Ag Cu Bi Cr Fe Mn Ba Mg K	1.45	
	Hg <sup>2+</sup> Hg <sup>2+</sup> Sb Al Zn Ca Mg Na	1.45	
	Pb Cu Sn Cr Fe Mn Sr Mg	1.45	
	Hg <sup>2+</sup> Hg <sup>2+</sup> Cu Cr Mn Ba NH <sub>4</sub>	1.45	
	Pb Bi Al Mn Zn Sr Mg K	1.45	
	Ag Hg <sup>2+</sup> Sb Cr Mn Zn Ca NH <sub>4</sub>	1.45	
	Pb Bi Cr Fe Ba Mg K	1.45	
	Bi Hg <sup>2+</sup> Cr Mn Zn Sr Mg NH <sub>4</sub>	1.45	
	Pb Cu Sb Sn Al Fe Zn Ca Mg K	1.45	
	Ag Hg <sup>2+</sup> Sb Cr Mn Ba Sr NH <sub>4</sub>	1.45	
	Bi Hg <sup>2+</sup> Sn Fe Mn Ca Mg Na	1.45	
	Pb Cu Hg <sup>2+</sup> Sb Cr Mn Zn Sr Mg K	1.45	
	Pb Sb Al Zn Ba Ca Na	1.45	
	Cu Hg <sup>2+</sup> Al Fe Ca K	1.45	
	Ag Pb Bi Sn Al Cr Sr NH <sub>4</sub>	1.45	
	Hg <sup>2+</sup> Cu Hg <sup>2+</sup> Sb Fe Mn Zn Mg	1.45	
	Hg <sup>2+</sup> Pb Bi Hg <sup>2+</sup> Al Mn Ca Sr	1.45	
	Cu Bi Hg <sup>2+</sup> Sb Sn Cr Fe Zn Ba Sr Mg	1.45	
			<b>Qty Sub Total</b>
		<b>Qty Total</b>	

Basic charge for all custom unknowns is \$2.15 each

**A Reminder:** All qualitative analysis knowns and unknowns are for laboratory use only and to be used under the supervision of a trained laboratory instructor.

**Custom unknowns are now available on a limited basis.**

- Cobalt and nickel may be added to the listed unknowns
- Unknowns may be prepared with lead and mercury
- Allow 4-6 weeks preparation and delivery time for custom unknowns

2 Mil colored ziplock bags are now used in stocking dry qual unknowns. We no longer employ plastic vials or cellophane bags. We suggest you cut diagonally across the lower corner, away from the ziplock, to empty unknowns from the bags.



## ACCESSORY PRODUCTS: CHEMICAL INDICATOR TABLETS AND KITS

Catalog Number	Product	Qty	Unit Price	Ext.
88-2010	<b>INDI-TAB Kit #2</b> <i>In Potassium Nitrate:</i> Eriochrome Black T, Xylenol Orange, Par, Calcon, Snazoxs, Pan, Methylthymol Blue <i>In Sodium Chloride:</i> Fast Sulphon Black, Eriochrome Red B, Calcein Blue, Arsenazo III, Acid Alizarin Black SN		75.00	
88-3010	<b>CALCEIN</b> <i>In KCl:</i> Indicator for the determination of Calcium by titration with EDTA		12.75/vial	
88-3015	<b>CALCON</b> <i>In NaCl:</i> Indicator for the determination of Calcium by titration with EDTA		12.25/vial	
88-3020	<b>CALMAGITE</b> <i>In NaCl:</i> Indicator for the determination of Calcium plus Magnesium by titration with EDTA		13.75/vial	
88-3025	<b>ERIOCHROME BLACK-T</b> <i>In NaCl:</i> Indicator for the determination of Calcium plus Magnesium by titration with EDTA		12.00/vial	
88-3030	<b>HYDROXY NAPHTHOL BLUE</b> <i>In NaCl:</i> Indicator for the determination of Calcium by titration with EDTA		12.25/vial	
88-3035	<b>MUREXIDE</b> <i>In NaCl:</i> Compleximetric Indicator		14.25/vial	
88-3040	<b>XYLENOL ORANGE</b> <i>In NaCl:</i> Indicator for Compleximetric titrations		12.00/vial	
<b>A vial contains 50 indicator tablets.</b>			<b>Sub-Total</b>	<b>\$</b>

## ACCESSORY PRODUCTS: INDICATORS (POWDER/GRANULAR)

Catalog Number	Product	Qty	Unit Price	Ext.
85-1010	5 g NAS (Naphthylazoxine S) (EDTA/metallochromic)		\$ 30.00	
85-1025	30 g Hydroxy naphthol blue (EDTA/calcium)		27.50	
85-1050	5 g Calmagite (EDTA/calcium and magnesium)		24.50	
85-1100	30 g IndicatAR (pH 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, or 3-10 specify pH); in 1 oz. dispenser		25.00	
85-1125	5 g Eriochrome Black T (EDTA/calcium and magnesium)		10.25	
			<b>Sub-Total</b>	<b>\$</b>

## ACCESSORY PRODUCTS: MAGNETIC STIRRER (NON-ELECTRIC)

Catalog Number	Product	Qty	Unit Price	Ext.
84-1050	Magnetic Stirrer. This sturdy, compact unit is ideal for student use. Rotor powered by tap water, compressed air, or vacuum, it will not corrode. A teflon covered stirring bar is included.		\$ 54.00	
84-1056	The same as catalog number 84-1050, but sold in six units.		305.00	
84-1058	Teflon covered stirring bars; six units		85.00	
			<b>Sub-Total</b>	<b>\$</b>

## MISCELLANEOUS ITEMS

Catalog Number	Product	Qty	Unit Price	Ext.
84-1010	Empty 10 gram glass vials with plastic stopper cap. (3/4" diameter x 2" high); 25/pkg		\$ 10.25	
84-1013	Empty 3 gram glass vials with plastic stopper cap. 25/pkg		9.75	
84-1030	Stainless steel micro spatula for dispensing unknowns.		5.25	
			<b>Sub-Total</b>	<b>\$</b>



## Classroom Soil Test Kit



**Classroom Soil Test Kit (pH, N, P, K).** This kit contains liquid reagents and equipment for 40 total tests; 10 tests each for soil pH, Nitrogen, Phosphorus and Potash.

**Order No. 90-1662 \$17.00**

**\$69.95/CASE**

## Heavy Duty Textured, Powder Free, Exam Grade Nitrile

### GPNHD

Item Codes:

75-GPNHD64 MEDIUM  
75-GPNHD66 LARGE  
75-GPNHD68 X-LARGE



#### GENERAL DESCRIPTION

These extra strong (8 mil thick) and extra long (12") medical grade gloves provide added protection for the wrist and lower forearm. GlovePlus HD nitrile maintains excellent sensitivity while being twice as thick as standard nitrile gloves. Perfect for automotive, industrial, manufacturing, janitorial, EMS, medical and child care. 50 gloves per box, 10 boxes per case.

#### SPECIFICATIONS

##### EXTRA THICK (8 MIL) & EXTRA LONG (12")

With 3 times the puncture resistance of comparable latex or vinyl gloves. Perfect for even your toughest jobs!

**TENSILE STRENGTH** (Min. Mpa)  
Before Aging: 14 After Aging: 14

**ELASTICITY/ELONGATION** (%)  
Before Aging: 500 After Aging: 400

**AVG. MIN. POWDER MASS**  
2 mg / glove max. Per Glove

**AQL LEVEL**  
1.5

**CERTIFICATIONS**  
EN455-1-2-3, ISO 9001,  
Dermal Sensitization Test

##### 3 SIZES (M-XL)

Great fit for any size hand.

##### LATEX FREE

A terrific alternative for professionals concerned with latex sensitivity.

##### POWDER FREE

Prevents skin irritation associated with glove powders.

##### TEXTURED

Micro-roughened for non-slip wet gripping power.

**NITRILE WARNING:** Components used in making nitrile gloves may cause allergic reactions in certain individuals.



**\$53.25/CASE**

## Textured, Powder Free, Exam Grade Latex



### CLPF

Item Codes:

- 75-CLPF60 X-SMALL
- 75-CLPF62 SMALL
- 75-CLPF64 MEDIUM
- 75-CLPF66 LARGE
- 75-CLPF68 X-LARGE

#### GENERAL DESCRIPTION

These powder free durable exam grade latex gloves have less than 50 micrograms of protein. Preferred by professionals seeking a low protein, powder free glove that can really hold up to a multitude of tasks. Polymer coated permits easy donning and removal. Micro-roughened surface for non-slip grip. Great for: food service, child care, manufacturing, bakeries, nursing homes, dental and medical. 100 gloves per box, 10 boxes per case.

#### SPECIFICATIONS

##### MIL THICKNESS

4 Mil

##### TENSILE STRENGTH (Min. Mpa)

Before Aging: 21

After Aging: 16

##### ELASTICITY/ELONGATION (%)

Before Aging: 700

After Aging: 500

##### PROTEIN CONTENT

Less than 50 micrograms

##### MIN. AVG. POWDER MASS

2 mg / glove max.

##### AQL LEVEL

1.5

##### 5 SIZES (XS - XL)

Find your perfect fit!

##### POWDER-FREE

For no mess or irritation

##### POLYMER COATED

For easier donning

##### TEXTURED

For a secure wet or dry grip.

##### LOW PROTEIN

Extended leaching significantly reduces protein levels to less than 50 micrograms.

**LATEX WARNING:** This product contains natural rubber latex which may cause allergic reactions in certain individuals.

**\$61.95/CASE**

## Textured, Powder Free, Exam Grade Nitrile



### APFN

Item Codes:

- 75-APFN42 SMALL
- 75-APFN44 MEDIUM
- 75-APFN46 LARGE
- 75-APFN48 X-LARGE

#### GENERAL DESCRIPTION

These high performance, medical grade nitrile gloves are powder and latex free, with a micro-roughened textured grip. The preferred choice for latex sensitive individuals, they provide superior comfort and strength, with unsurpassed tactile sensitivity. Great for: automotive, industrial, manufacturing, janitorial, maintenance, and agriculture. 100 gloves per box, 10 boxes per case.

#### SPECIFICATIONS

##### MIL THICKNESS

Palm: 4 mil Fingertips: 5 mil

##### TENSILE STRENGTH (Min. Mpa)

Before Aging: 14 After Aging: 14

##### ELASTICITY/ELONGATION (%)

Before Aging: 500 After Aging: 400

##### MIN. AVG. POWDER MASS

2 mg / glove max.

##### AQL LEVEL 1.5

##### CERTIFICATIONS

EN455-1-2-3, EN374-1-2-3, ISO 9001, Viral Penetration Test, Dermal Sensitization Test, Chemo Test

##### 4 SIZES (S-XL)

Great fit for any size hand.

##### LATEX FREE

A terrific alternative for professionals concerned with latex sensitivity.

##### POWDER FREE

Prevents skin irritation associated with glove powders.

##### TEXTURED

Micro-roughened for non-slip wet gripping power.

##### ENHANCED PUNCTURE RESISTANCE

3 times the puncture resistance of comparable latex or vinyl gloves.

**NITRILE WARNING:** Components used in making nitrile gloves may cause allergic reactions in certain individuals.

## POWDER-FREE E-GRIP LATEX GLOVES (MICRO-TEXTURED SATIN FINISH)

SPECIAL PRICING PER CASE (10 BOXES)

**\$62.50/CASE**



- ◆ Powder-free
- ◆ Micro-textured satin finish
- ◆ Single chlorinated
- ◆ Exceptional elasticity/tension strength
- ◆ Low protein 510K
- ◆ 9-1/2 inchs length
- ◆ Non-sterile/Ambidextrous

75-0970	Extra-Small
75-0971	Small
75-0972	Medium
75-0973	Large
75-0974	Extra-Large
100/box	

*Offers enhanced tactile sensitivity and grip. The HIGH FIVE powder-free latex glove is produced using state-of-the-art manufacturing, minimizing extractable chemicals and reducing water soluble proteins to nearly undetectable levels which reduces risk of allergic reactions and skin irritation. The subtle texturing offers exceptional gripping power with out compromising tactile sensitivity. Manufactured to the highest levels of quality assurance HIGH FIVE latex gloves meet or exceed federal and ASTM tear and puncture-resistance standards. Other features include: 100% tested for pinholes and defects, ISO 9002 certification, 1.5 AQL pinhole rating, 510K approved for medical use, non-sterile and ambidextrous, beaded cuff for easier donning.*

## POWDER-FREE FLEX-VINYL GLOVES (100% LATEX-FREE)

SPECIAL PRICING PER CASE (10 BOXES)

**\$33.25/CASE**



- ◆ 100% Latex-free/powder-free
- ◆ Exceptional elasticity/tensile strength
- ◆ 9 inch length
- ◆ Non-sterile/ambidextrous
- ◆ Approved for medical use

75-0601	Small
75-0602	Medium
75-0603	Large
75-0604	Extra-Large
100/box	

*The HIGH FIVE Flex-Vinyl glove stretches and conforms to provide a superior fit and feel compared to conventional vinyl gloves. Our double-layer construction provides durability coupled with extremely low pin hole rates (AQL levels below 2.5). Since this glove contains absolutely no natural rubber proteins, it can be used as an affordable alternative to latex. The HIGH FIVE Flex-Vinyl glove is manufactured in an ISO 9002 certified facility.*

## POWDER-FREE NITRILE GLOVES (100% LATEX-FREE, TEXTURED)

SPECIAL PRICING PER CASE (10 BOXES)

**\$70.00/CASE**



- ◆ 100% Latex-free/powder-free
- ◆ Superior puncture and chemical resistance
- ◆ Proprietary low modulus formulation reduces hand fatigue
- ◆ No MBT's, Thiriums or Carbamates
- ◆ 100% inspected/approved for medical use
- ◆ 9-1/2 inch length beaded cuff
- ◆ 5-6 mil thickness
- ◆ Non-sterile/ambidextrous

75-0850	Extra-Small
75-0851	Small
75-0852	Medium
75-0853	Large
75-0854	Extra-Large
100/box	

*The HIGH FIVE nitrile glove is 100% Latex-Free and contains no natural rubber proteins. This soft and supple glove is easy to don, odor-free, and offers an unequalled fit and feel compared to conventional exam gloves. Our unique synthetic formulation reduces hand fatigue and offers superior puncture resistance and chemical resistance compared to latex or vinyl gloves. The HIGH FIVE powder-free nitrile is the ideal solution for individuals allergic to latex. Hand packed in convenient dispenser boxes; color-coded by size.*

## POWDER-FREE SYNTHETIC/APPLAUSE GLOVES (100% LATEX-FREE)

SPECIAL PRICING PER CASE (10 BOXES)

**\$45.00/CASE**



- ◆ 100% Latex-free/powder-free
- ◆ Proprietary synthetic formulation
- ◆ Exceptional elasticity/tensile strength
- ◆ Opaque/tan color
- ◆ Affordable latex alternative

75-0201	Small
75-0202	Medium
75-0203	Large
75-0204	Extra-Large
100/box	

*The APPLAUSE synthetic glove looks and feels like latex yet does not contain allergy-causing proteins. Our proprietary synthetic formulation produces an exam glove that is durable, form fitting, and has excellent barrier qualities. The APPLAUSE exam glove is a dependable and affordable latex alternative.*

\*We are the proud distributors of disposable gloves from Ammex Corp. and laboratory safety equipment from High Five Products. For a complete listing of these products please visit: [www.glovesbyweb.com](http://www.glovesbyweb.com)

## HIGH FIVE WBP LAB COATS



- ◆ Elastic Wrist
- ◆ Five Snap Closure
- ◆ Two Pockets
- ◆ Comes in White Only

76-0242	Medium	\$3.00 each
76-0243	Large	3.10 each
76-0244	X-Large	3.15 each
76-0245	2XL	3.20 each
76-0246	3XL	3.25 each

*WBP Lab Coats are Microporous construction similar to Tyvek. They are 100% Waterproof. They are lightweight, cool, and comfortable. The generous cut improves fit and adds comfort.*

## HIGH FIVE SMS LAB COATS



- ◆ White or Blue
- ◆ Blue not Available in Medium Size
- ◆ Knit Collar
- ◆ 5 Snaps
- ◆ Three Pockets

76-0352	White Medium	\$2.25 each
76-0353	White Large	2.40 each
76-0354	White X-Large	2.45 each
76-0355	White 2XL	2.50 each
76-0356	White 3XL	2.55 each
76-0373	Blue Large	\$2.40 each
76-0374	Blue X-Large	2.45 each
76-0375	Blue 2XL	2.55 each
76-0376	Blue 3XL	2.65 each

*Keep workers safe from numerous dry particulates and most water-based liquids. Features a knit collar and cuffs for added comfort. Snap front closure for easy on and off.*

## HIGH FIVE DUST NUISANCE MASKS



- ◆ Packs of 50

76-0150	Dust Mask	\$4.75 each
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*Get relief from irritating dusts and pollen. Single elastic head band and moldable nosepiece. Not NIOSH approved.*



**Thorn Smith Laboratories**  
A Division of Auric Enterprises, Inc.  
7755 Narrow Gauge Road  
Beulah, MI 49617  
www.thornsmithlabs.com

## ORDER FORM

Totals from previous pages . . . . . \$ \_\_\_\_\_

Net amount of order . . . . . \$ \_\_\_\_\_

Add \$5.00 handling charge if order is under \$25.00 . . . . . \$ \_\_\_\_\_

Poison Packs (see page 4 for more information) . . . . . \$ \_\_\_\_\_

**Total (plus shipping charges)** . . . . . \$ \_\_\_\_\_

## ORDERING & PRICING INFORMATION

All the products in this catalog must be used under the close supervision of a trained chemist or qualified chemistry professor.

### To Place Your Order:

Call: 231-882-4672 or 231-882-7251  
Fax: 231-882-4804  
Mail: Thorn Smith Laboratories  
7755 Narrow Gauge Road  
Beulah, MI 49617

### Pricing Policy:

Prices do not include shipping charges, as our listed prices are FOB Beulah, MI. If you do not see what you want, ask us as some materials are not listed.

### Minimum Order:

Orders under \$25 are subject to a \$5.00 handling charge.

### Payment Terms:

Invoices are payable net 30 days for all accounts. A service charge of 1½% per month will be assessed on late payments. We also accept VISA, MASTERCARD and AMERICAN EXPRESS.



### Other:

Orders will be filled if revised prices do not exceed 10%. We try to hold prices firm, but prices are subject to change without notice.

*Material Safety Data Sheets are provided with each order.*

*All payments must be made in U.S. dollars.*

**TO ORDER CALL: 231-882-4672, 231-882-7251, OR FAX: 231-882-4804 FROM 9AM TO 4:30PM EST**

**TO ORDER CALL: 231-882-4672 OR 231-882-7251**

(prices do not include shipping charges)

### Canadian Customers Only:

Shipping charges may be cost prohibitive when ordering hazardous materials.  
Please call for shipping quote prior to ordering.

**QUANTITATIVE UNKNOWNNS AND QUALITATIVE UNKNOWNNS**