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INTER-AMERICAN DRUG ABUSE CONTROL COMMISSION

cicad

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SPECIAL TESTING AND RESEARCH LABORATORY

U.S. DEPARTMENT OF JUSTICE

DRUG ENFORCEMENT ADMINISTRATION (DEA)

Extraction of Methamphetamine Precursor Material from Medicinal Preparations and Methamphetamine Profiling Results



Dr. Steven G. Toske
Special Testing and Research Laboratory

Common Methamphetamine Precursors

- Ephedrine or Pseudoephedrine
- Phenyl-2-Propanone (P2P)

Pseudoephedrine/Ephedrine (Sources)

- Ephedrine/Pseudoephedrine are natural products that can be isolated individually from the Ephedra plant commonly cultivated in China and India.
- Ephedra products can be obtained in tablet or capsule form as part of diet pills..



Ephedra is BACK!
Who knows for how long...?



Lipodrene
FOR ADVANCED APPETITE
CONTROL AND METABOLIC
STIMULATION
Dietary
Supplement

Stimerex-ES
Extra Strength Ephedra
Extract
NATURAL
ENERGIZER

Best Seller! **Strongest!**

Stock Up Now! - Volume Discounts Apply!

Pseudoephedrine/Ephedrine (Sources)

- Pseudoephedrine HCl and Ephedrine HCl can be produced synthetically
- Ephedrine HCl is used as a stimulant/decongestant to control asthma
- Pseudoephedrine HCl is a common ingredient in Over-the-Counter decongestant tablets



Simple Extraction of Tablets



- Grind Tablets
- Alcohol
- Filter
- Evaporate
- Resulting Powder Contains Pseudoephedrine or Ephedrine

Tablet Binder Extraction Waste



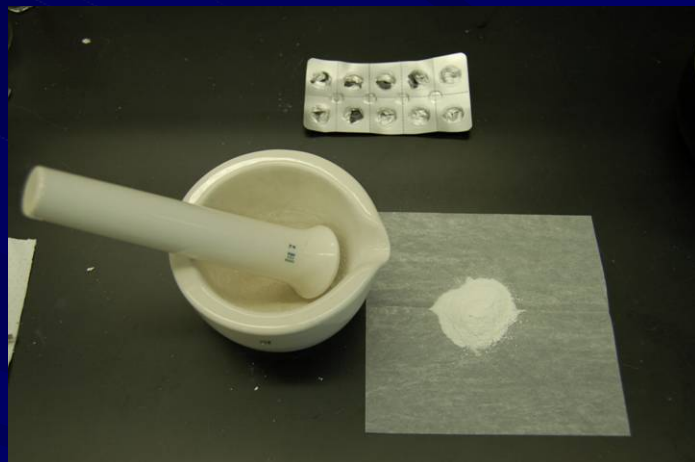
Cold and Flu Preparations Containing Pseudoephedrine Hydrochloride



Cold and Flu Preparations Containing Pseudoephedrine Hydrochloride

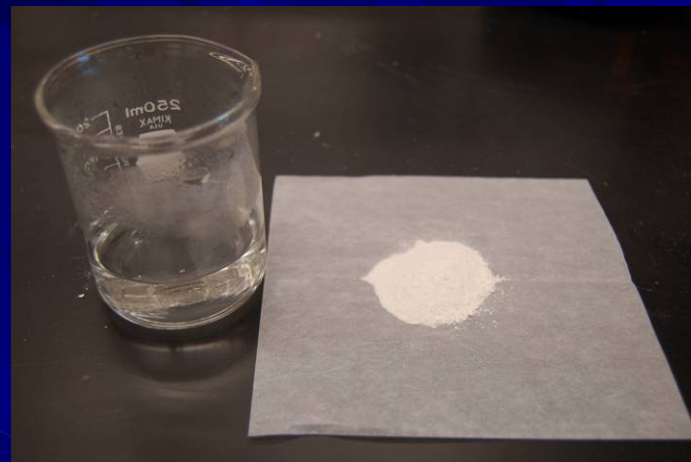
Product	Form	Pseudoephedrine HCl per dose (mg)	Co-Ingredients
1	tablets	30	acetaminophen (500 mg)
2	coated tablets	30	acetaminophen (500 mg) diphenhydramine HCl (25 mg)
3	soft gelatin capsules	30	acetaminophen (250 mg) dextromethorphan HBr (10mg) guaifenesin (100 mg)
4	soft gelatin capsules	30	acetaminophen (325 mg) dextromethorphan HBr (15 mg)
5	liquid	30 (15 mL)	acetaminophen (500 mg) dextromethorphan HBr (15 mg) doxylamine succinate (7.25 mg)

Acid/Base Tablet Extraction

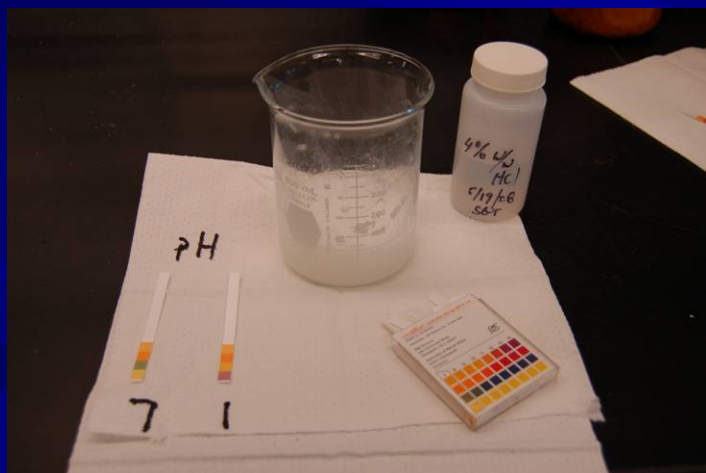


Grind Tablets

Coated Tablet Powder Passed through Sieve to Remove Large Pieces of Coating



Add Powder into Hot Water and Stir



**Adjust pH to 1 with HCl
(Muriatic Acid Can Be Used)**

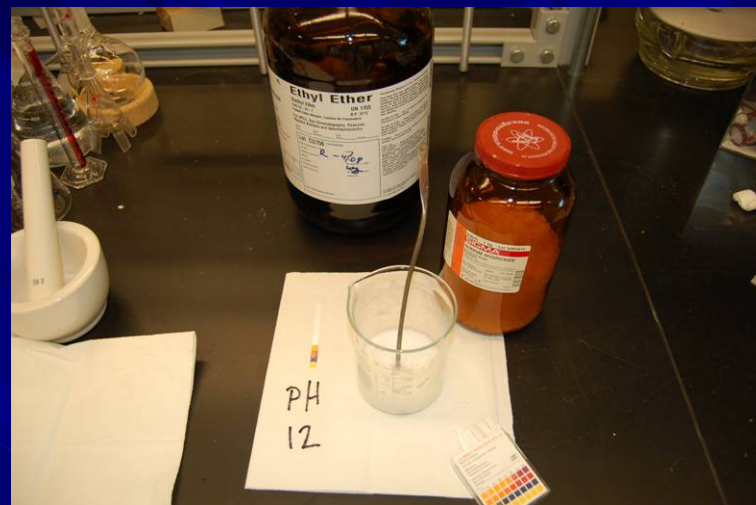


**Extract 3 Times with Ether
(Starter Fluid Can Be Used)**

Acid/Base Tablet Extraction



Discard Ether Washes



**Adjust pH to 12 with NaOH
(Common Drain Cleaner Can Be Used)**

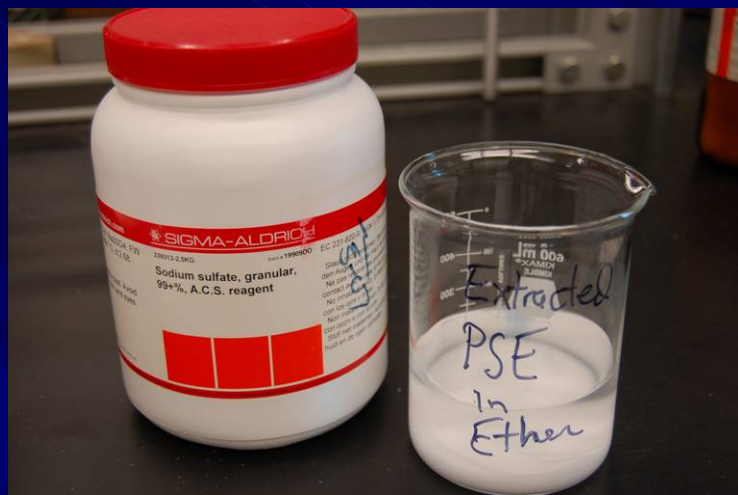


Extract 3 Times with Ether



Collect Ether Containing Pseudoephedrine

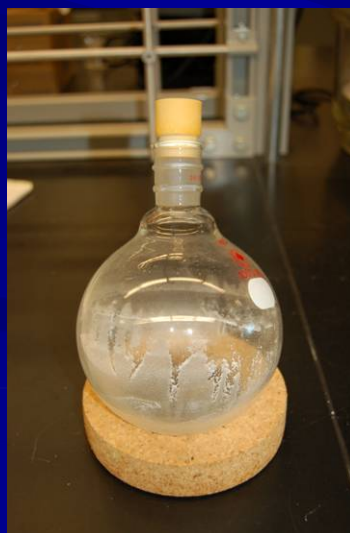
Acid/Base Tablet Extraction



Wash Ether with Water then Dry Using Sodium Sulfate



Pour or Filter Ether to Another Beaker for Evaporation



Final Pseudoephedrine Powder

Cold and Flu Preparations Extraction Results

Product	Form	Purity of Recovered Pseudoephedrine Base (%)	Yield* (%)	Other Drugs Still Present
1	tablets	99	58	None
2	coated tablets	46	40	acetaminophen diphenhydramine
3	soft gelatin capsules	51	45	dextromethorphan guaifenesin
4	soft gelatin capsules	90	46	dextromethorphan
5	liquid	66	75	dextromethorphan doxylamine

***Percentage of Pseudoephedrine Recovered,
Calculated as Pseudoephedrine HCl**

Allergy and Decongestant Preparations Containing Pseudoephedrine

Product	Form	Pseudoephedrine per dose (mg)	Additional Drugs Present
6 12 Hour Release	tablets	120*	loratadine (5mg)
7 24 Hour Release	tablets	240*	loratadine (10mg)
8 Extended Release	tablets	60**	guaifenesin (600mg)

*Pseudoephedrine Sulfate

**Pseudoephedrine HCl

Extraction Results

Product	Extraction Procedure	Dosage Units Used	Purity of Recovered Pseudoephedrine Base (%)	Yield (%)
6 (12 hour)	1	20	95	60
6	1	10	96	62
7 (24 hour)	1	20	43	3
7	2	10	25	8
7	3	5	70	38
7	4	5	46	10
7	5	10	66	26
7	6	10	89	22
7	7	10	71	9

Loratadine was present in all pseudoephedrine extracts

Product 8 Extraction Results

Dosage Units Used (800 mg)	Purity of Recovered Pseudoephedrine Base (%)	Theoretical Weight Pseudoephedrine Base (mg)	Amount Pseudoephedrine Recovered (mg) (as base)	Yield (%)
4	41*	196.5	98.3	50**

***Extract also contained 56% guaifenesin.**

****Best Result after Several Poor Yielding Attempts Using Procedure 1.**

Extraction Conclusions

- In all cases, pseudoephedrine was extracted out with varying degrees of success (3% to 75% yields).
- The selected acid/base extraction worked well on the pseudoephedrine/acetaminophen tablets. Also, extraction of the 12h time release tablets was efficient.
- Lower pseudoephedrine purities were observed when other active drugs were present.
- The selected extraction methods used are not amenable for scaling up for the extended release formulations. **However, there are other extraction methods available on the internet which may be effective.**

Methamphetamine Profiling Program

- Selected samples from the seven U.S. regions are supplied by seven DEA regional labs.
- Samples representing the Mexico and Canada regions are obtained from border or Port-of-Entry seizures.
- Foreign samples have been obtained mainly from support to other governments.
- Since 4Q-2004: Purity, Isomer, Cutting Agent, OTC Impurity, and Synthetic Route Trends have been established and monitored.

MPP Regions



4Q-2008 Purity Trends (162 Samples)

MPP Region	Overall Purity	Small Seizures	Medium Seizures	Large Seizures
Northwest	63.6	46.3	73.5	88.1*
Southwest	76.5	66.7	71.8	91.4
North Central	51.2	44.1	59.0*	100*
South Central	52.2	44.9	35.3	80.1
Northeast	73.0	68.1	NA	79.6
Southeast	50.4	47.0	49.9	82.3
Pacific	97.0	96.7*	97.2*	NA
Mexico	97.0	99.1*	94.7	97.4
Canada	NA	NA	NA	NA
Foreign	97.5	97.5*	NA	NA
Average Purity	71.4	54.7	68.2	92.7

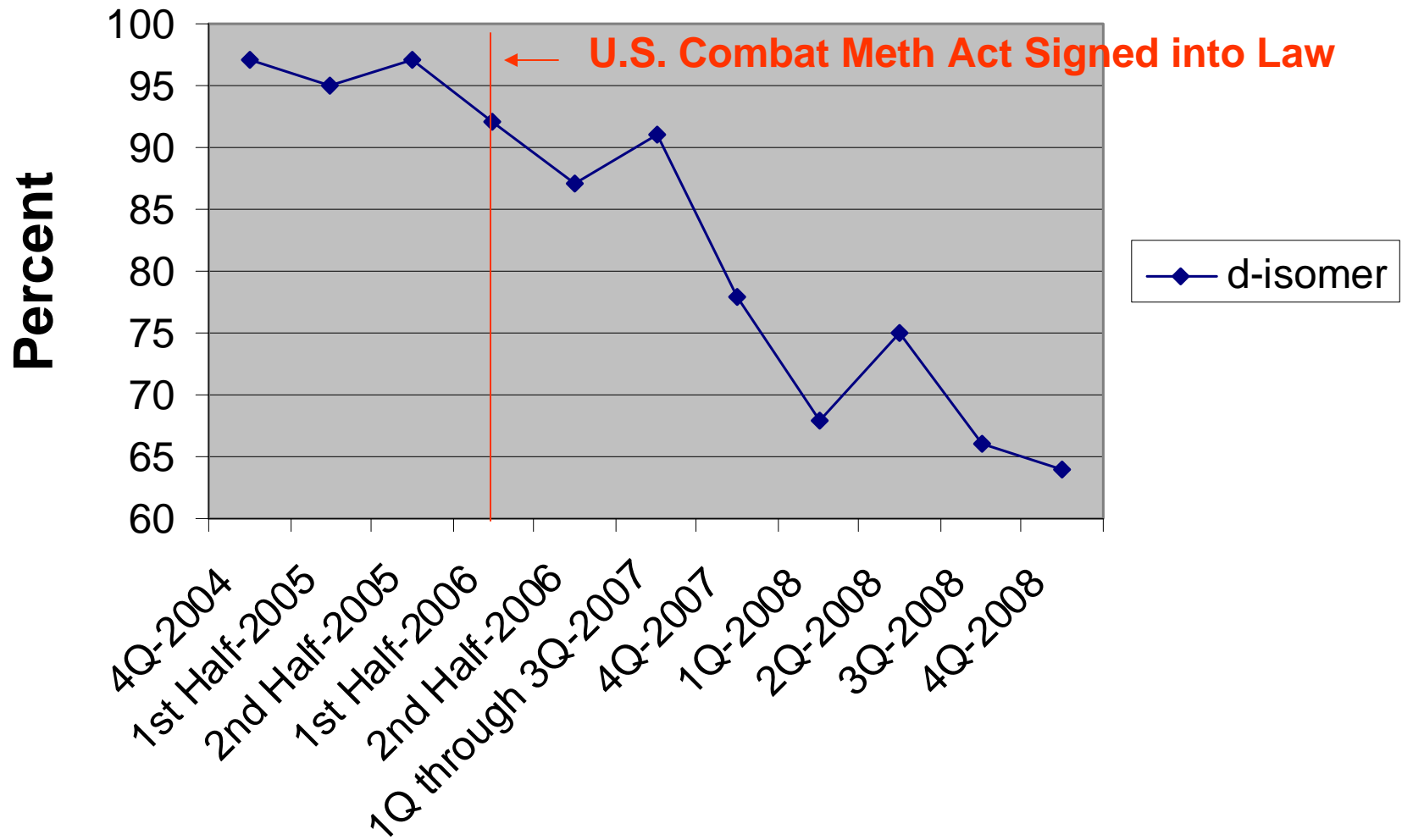
Small Seizure: 6 g to 100g

Medium Seizure: 101 g to 999 g

Large Seizure: > 1000 g

* Only one sample was available in this category for the purity calculation.

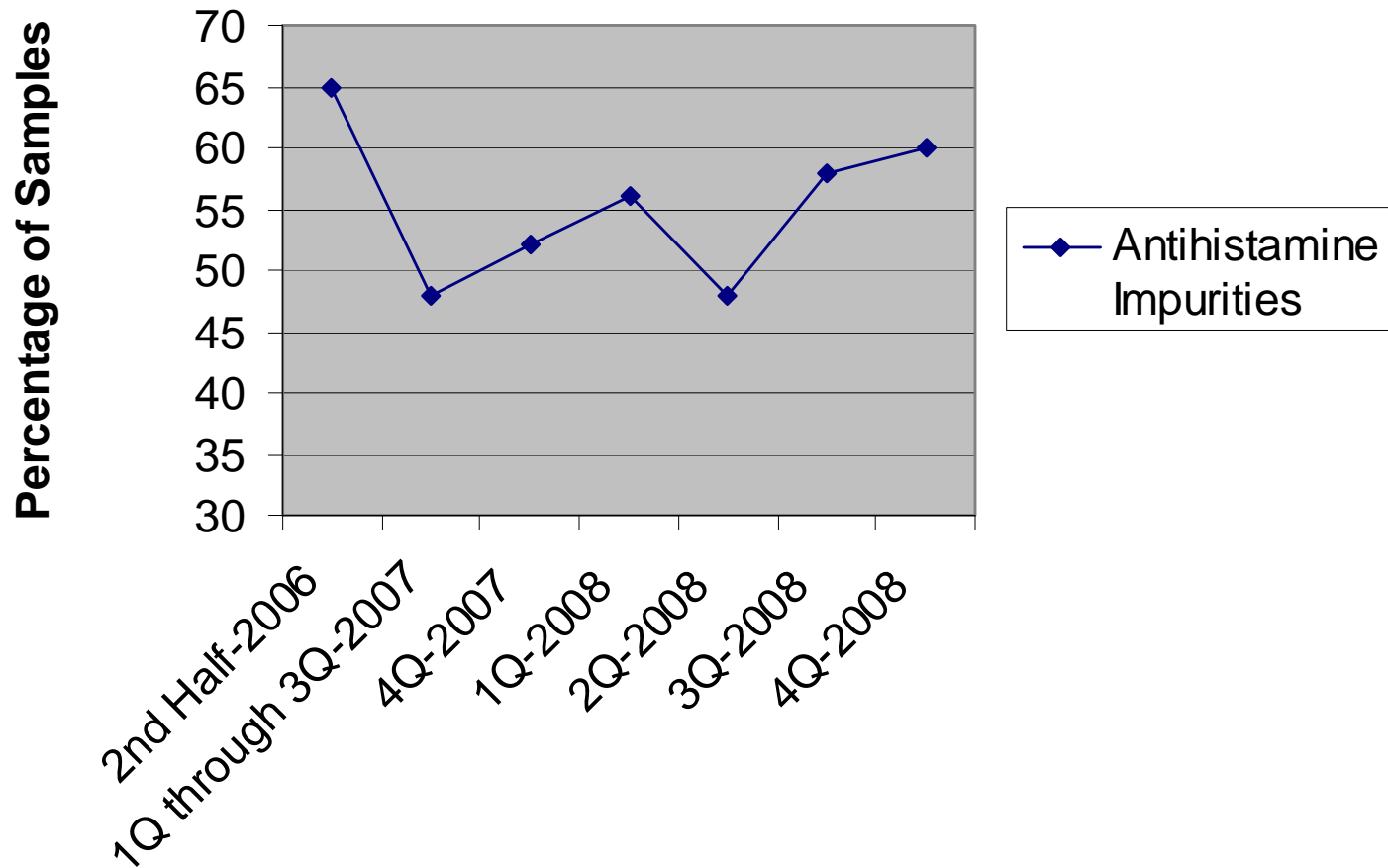
d-Isomer Trend Line



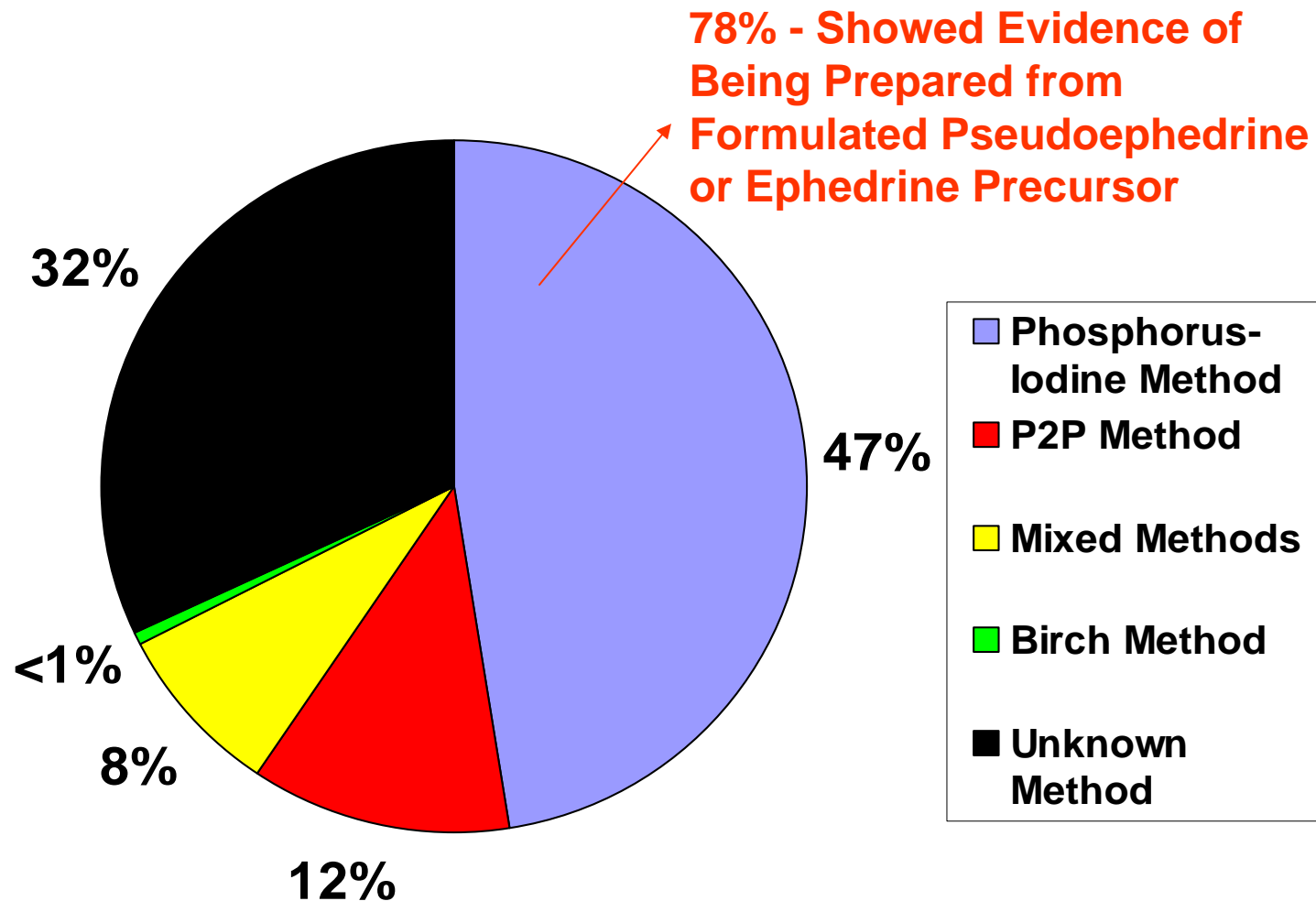
Percentage of Antihistamine Drugs Detected as Trace Components 4Q-2008 (162 Samples)

■ Chlorpheniramine	46%
■ Triprolidine	35%
■ Loratadine	17%
■ Brompheniramine	10%
■ Dextromethorphan	5%
■ Carbinoxamine	1%
■ Triprolidine/Chlorpheniramine	23%

Samples Containing Antihistamine Impurities



Synthetic Route Determination (4Q-2008)





Questions???

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