

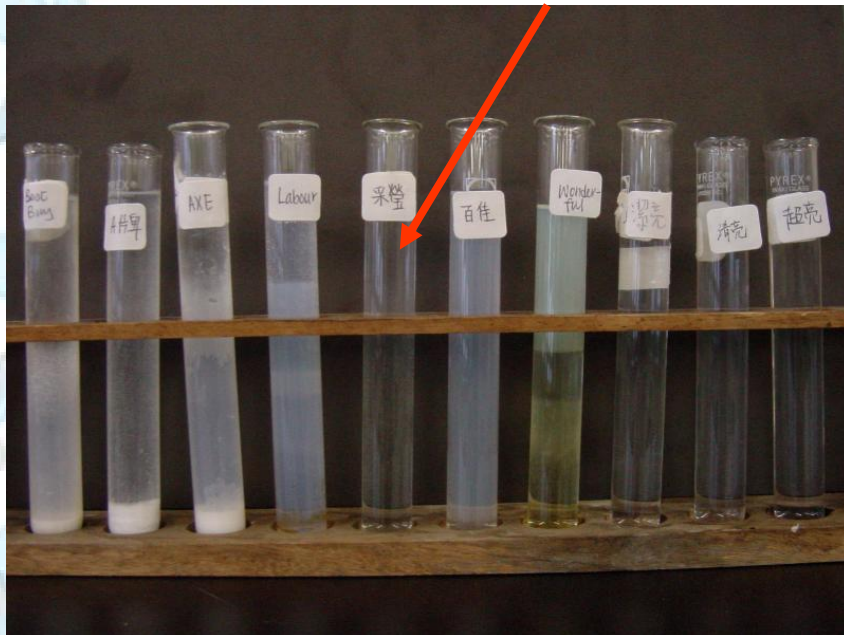
The result is not satisfactory, because:

- Precipitate was too fine.
- Organic substances in detergent formed oily layer between the mixture.
- The test tube used in centrifugation is small, high concentration of detergent is needed.

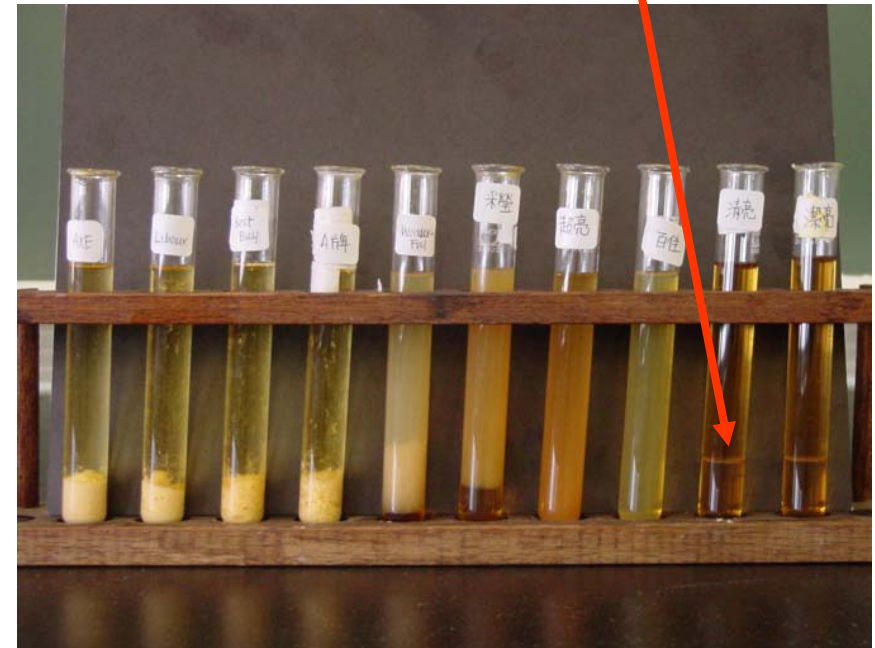


Centrifuge

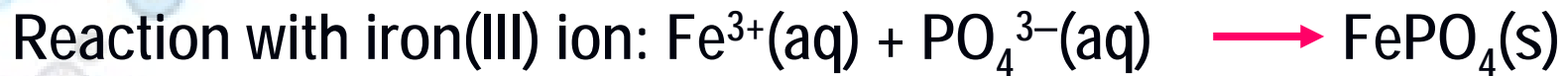
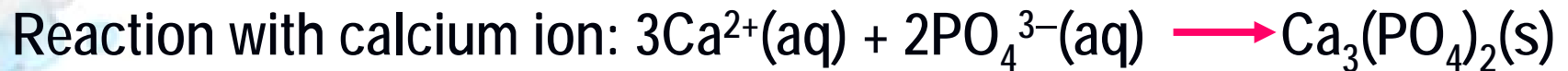
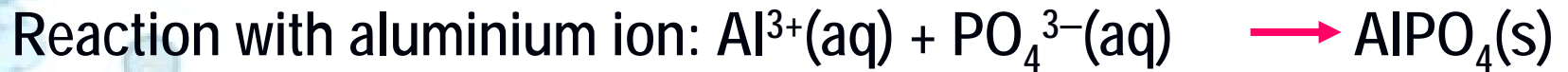
Fine Precipitate



oily layer



- The salt of these 3 ions has low solubility
- In some countries these 3 ions are used to extract phosphate in sewage



- Preliminary results was obtained even 1,1,1-trichloroethane was not used



- difficult to obtain good result in the extraction
→ as the separating funnel cannot be shaken too strongly



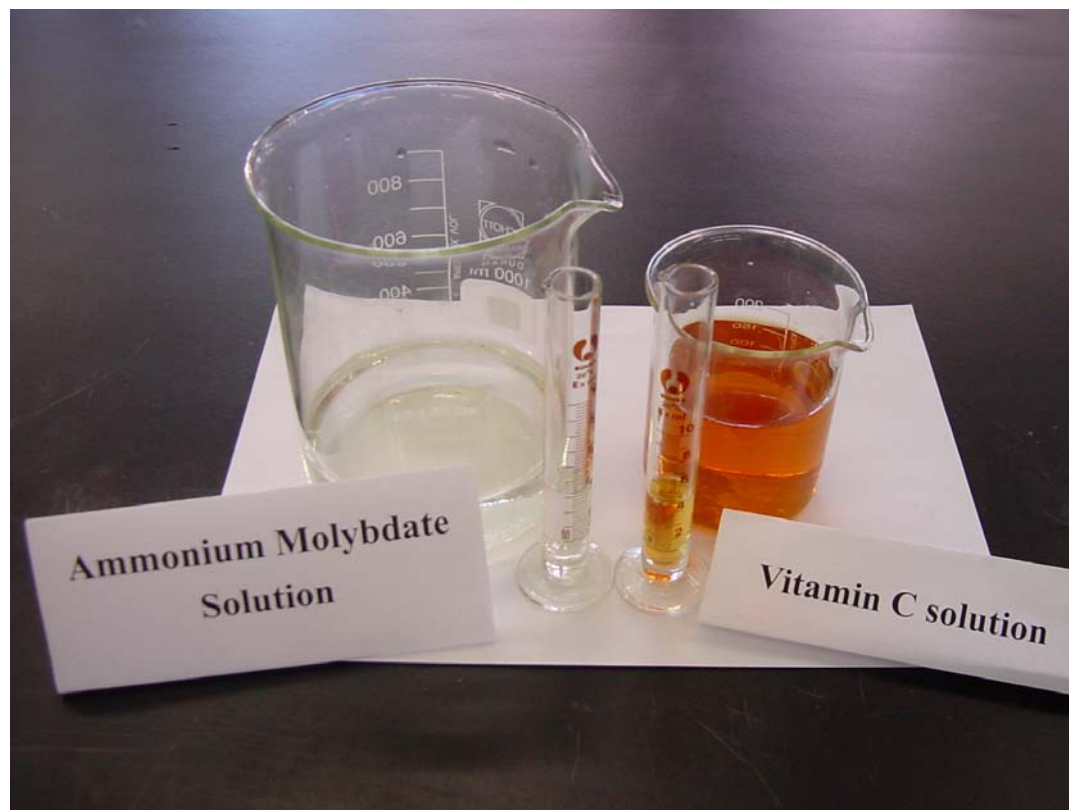
Best Buy may contain other substance (organic or inorganic) which form precipitate when reacting with metal ions.

However using 1,1,1-trichloroethane to extract organic substance may not be work.

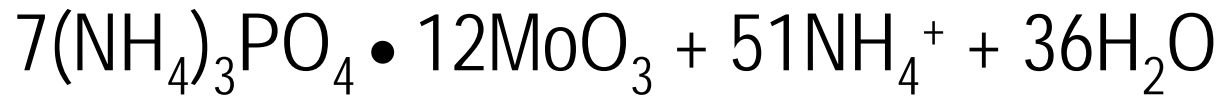
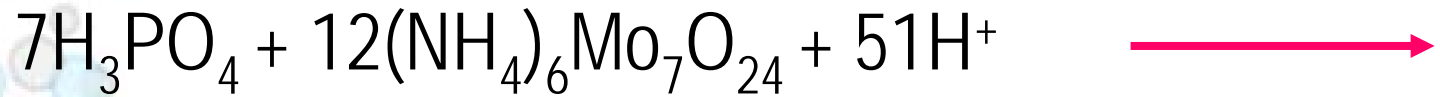
Extraction of organic substance using 1,1,1-trichloroethane.



Reactant mixture (vitamin C and ammonium molybdate) have colour by their own



Sulphuric acid provides H^+ for the following reaction:



Yellow Complex

Vitamin C reduces the molybdenum from +6 state to the +5 state:

+6



+5



Some of the detergent have their own colour



Molybdenum Method can be interfered by:

- Silicate
- Arsenate
- Germinate

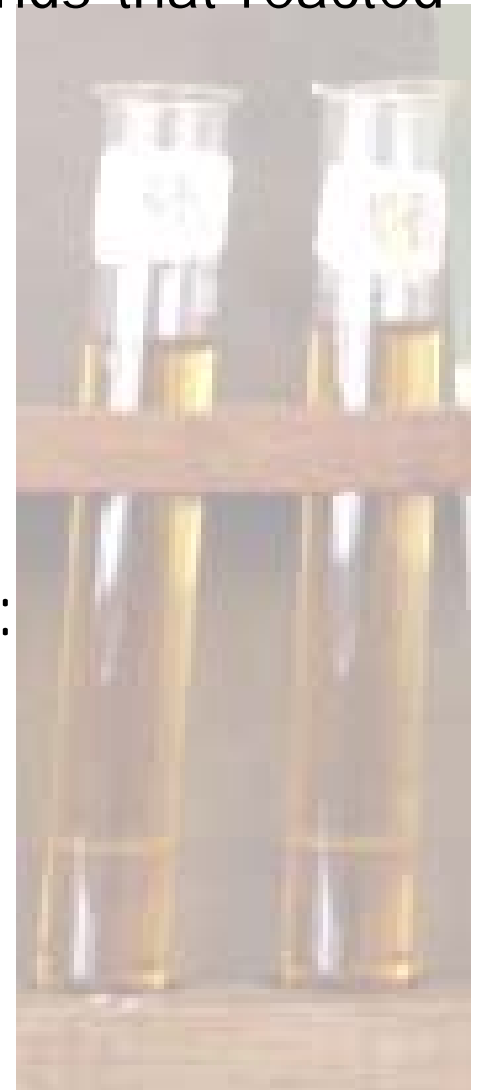
They will form heteropoly acid which on reduction yield molybdenum blue species with similar absorption maxima. However these chemicals were seldom found in detergents.

Detergents may contain organic compounds that reacted with the reagent used.e.g.

- Amide
- Butaine
- Henkel

Example of other substances in detergent:

- Potassium Hydroxide
- Caustic Soda
- Sodium lauryl ethyl sulphate
- Ethanol
- Sodium Citrate



Titration method

- Titrate H_3PO_4 against NaOH and convert it to H_2PO_4^-
$$\text{H}_3\text{PO}_4 + \text{OH}^- \rightarrow \text{H}_2\text{P O}_4^- + \text{H}_2\text{O}$$
- mixed indicator solution is used
- End point can be observed when indicator change from yellow green to pink.
- The amount of phosphate in detergent corresponds to the amount of base used between the pH 4.3 and pH 8.8 endpoints.

PDF file

醋搭梳打粉 污迹剋星

前陣子，白醋已掀過一陣熱潮，那便是優醋殺菌潮，與其試優醋這股無稽的方法，不如用醋來清潔家居。白醋其實具有一定的殺菌能力，好似沙門氏菌、大腸菌、赤痢菌等，而且其酸性雖然較弱，卻有效去除油迹、霉菌等污垢，最緊要對皮膚的傷害不大。

Apple Daily

17th May 2003

健康保衛戰

屋企日洗夜洗，全屋充斥着濃濃的漂白水味，這種消毒味由嗅覺直達中樞神經，敏感起來會引致喉嚨痛及頭痛，的確不太好受。唔想咁可以點樣呢？不如試試用天然的材料製做清潔劑，好似一支唔使 \$10 嘅白醋，原來是很好的清潔劑，可去除油迹外，又具殺菌效用，有咗佢，刺鼻嘅漂白水可以放埋一邊喇！

記者：區佩嫻 攝影：梁紹權 Model：Kenny & Benny (From Sun Spot)

醋搭梳打粉 污迹剋星

前陣子，白醋已掀過一陣熱潮，那便是優醋殺菌潮，與其試優醋這股無稽的方法，不如用醋來清潔家居。白醋其實具有一定的殺菌能力，好似沙門氏菌、大腸菌、赤痢菌等，而且其酸性雖然較弱，卻有效去除油迹、霉菌等污垢，最緊要對皮膚的傷害不大。



① 萬用洗地水

醋和梳打粉的確幾好用，清除地板的污垢及油迹效果都不錯。不同的地板所需的份量亦有分別，一般的地板可以用 6 湯匙梳打粉加半桶水便可，又或用半杯醋混合 15 公升的清水清潔。至於充滿油迹的廚房瓷磚地板，則可以一杯白醋加入半桶水。這些清潔劑沒有漂白水的刺鼻感覺，又有效去除污迹，最啱飼養動物或者有小朋友的屋企使用。

抹廚櫃去濕氣

廚房及浴室的櫃經常處於潮濕狀態，很易出現霉菌及異味。要解決這種難纏的問題，不妨抹櫃時在水中加 1 至 2 湯匙白醋，可殺菌外，又可驅除異味。



去污粉代替品

覺得使用去污粉清潔浴缸或瓷磚更得心應手，但又怕未融掉的去污粉淤塞喉管，可將白醋及梳打粉混合成糊狀，然後再用來對付廁所及廚房的污迹，效果與市面所買的去污粉無異。

② 通渠劑去淤塞

自從淘大的污水喉管引致「沙士」爆發後，好多人人都關心家中水渠有否淤塞，而洗碗盆就最常出現淤塞問題。其實這問題大多是將過量油膩的東西倒進渠內所致，只要先用白醋及梳打粉各 1/4 杯倒進水渠內，然後再倒入熱水，兩者發揮的去油作用便可將渠內的肥膩物去除，效果快捷。



③ 去水龍頭霉菌

水龍頭經常布滿因肥皂和牙膏引致的污迹，再加上水迹的累積，霉菌很容易形成。要去除這些又白又黑的污迹，有時用海綿擦也擦不掉，不妨用蘸了白醋的棉花覆蓋該污迹位置，待 30 分鐘後，醋酸便可將污迹溶解，用布一拭便可清除。

污迹細菌絕跡 一支白醋用勻全屋

逢星期一

其他

抽氣扇要

抽氣扇油好長時間洗都油迹，要徹底油污，不妨將上，待 15 分鐘油迹便會變薄水清洗，效果




雞蛋殼洗

熱水要小，難以清潔污迹，半的水動，



去污粉代替品 ▶

覺得使用去污粉清潔浴缸或瓷磚更得心應手，但又怕未融掉的去污粉淤塞喉管，可將白醋及梳打粉混合成糊狀，然後再用來對付廁所及廚房的污迹，效果與市面所買的去污粉無異。



The Five Basics for Non-toxic Cleaning

The ingredients of baking soda are:

- Corn Starch, Sodium Bicarbonate, Sodium Aluminium Sulphate



The image shows a yellow and red label for 'Ideal' brand baking powder. The label features a large, stylized red and blue graphic of a flower or cloud shape. Inside this shape, the Chinese characters '美國' (USA) and '泡打粉' (Baking Powder) are written in large red font. Below this, 'USABAKING POWDER' is written in bold black letters. At the bottom of the graphic, 'Net wt. 56g' is printed. To the right of the graphic, there is a list of ingredients in Chinese and English, and contact information for the distributor in Hong Kong. A handwritten date '05.07.' is visible in the bottom right corner.

成份：粟粉、食用梳打粉、
碳酸氫鈉。

Ingredients: Corn Starch,
Sodium Bicarbonated,
Sodium Aluminium Sulfate.

經銷商：日隆辦館
香港新界葵涌葵德街15-33號
葵德工業中心第一期十樓D座
電話：(852)2428 0268
圖文傳真：(852)2481 4627

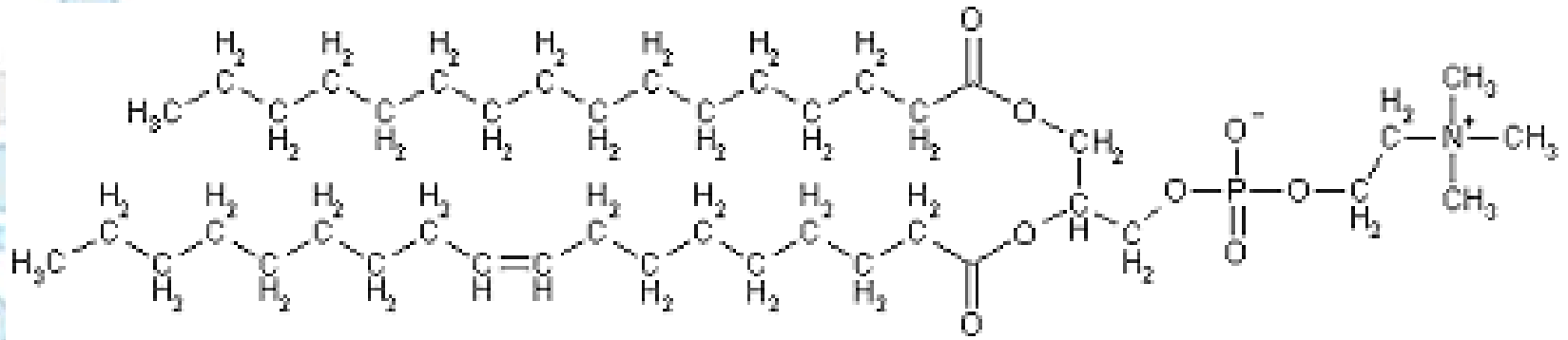
此日期前最佳：(日,月,年)
Best Before:

05.07.

The result obtained by using the residue is far more better than the filtrate.

∴ The residue is alkaline and mildly abrasive, thus make baking soda an effective scouring agent as well





Structure of Lecithin

- Lecithin may work differently in different pH.
- ∴ We tried to add common household materials which can change the pH of the homemade detergent, we have chosen vinegar and ammonia.

- We used small amount of vinegar and large amount of baking soda.
∴ alkali is in excess
- After neutralization with vinegar, there are still sufficient amount of alkali to react with oil to form soap.





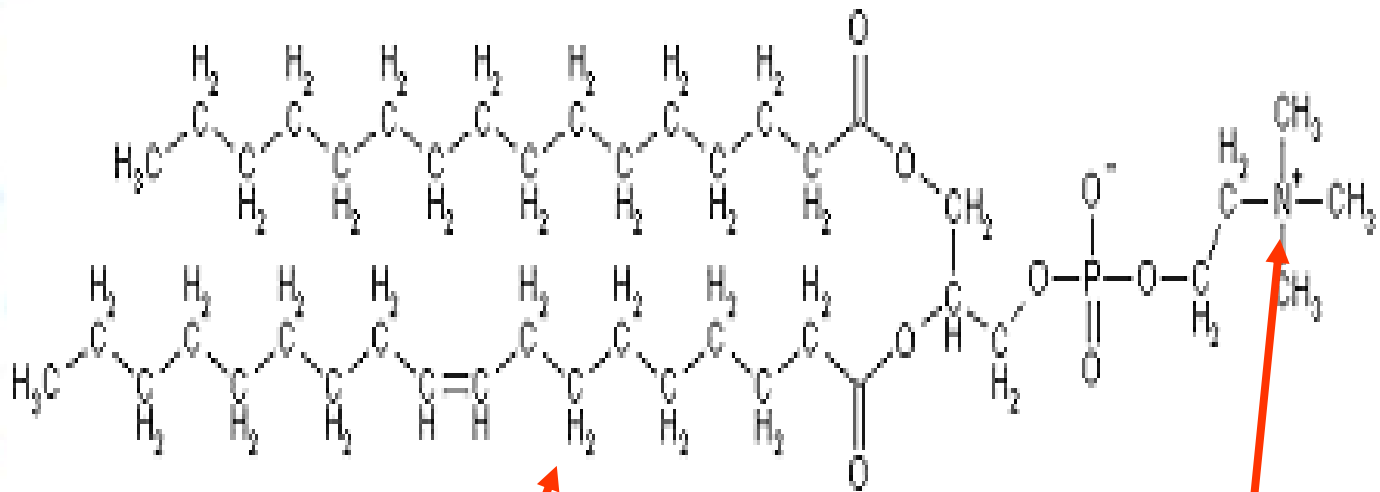
1) Baking soda + ammonia + grease → soap

2) Alkali + vinegar $\xrightarrow{\text{neutralization}}$ Salt + water



Lecithin is a phospholipid containing a hydrophilic "head" and a hydrophobic "tail".

Structure of Lecithin



Hydrophobic tail

Hydrophilic head

Chemical Composition of an Egg

Contents	Yolk (%)	White (%)
Water.	49.5	86.2
Albumen, vitellin etc.	14.5	12.7
Fat or oil	18	0.2
Lecithin etc.	11	traces
Mineral matter	1.0	0.7
Other substances	1.5	2.3

- Emulsifying effect of most lecithin is affected by Calcium level as low as 0.05%-0.1%.
- At salt level above 2%, lecithin is sensitive to the presence of Ca^{2+} and Mg^{2+} .
- ∴ Salts hinder emulsifying effect of lecithin.





1



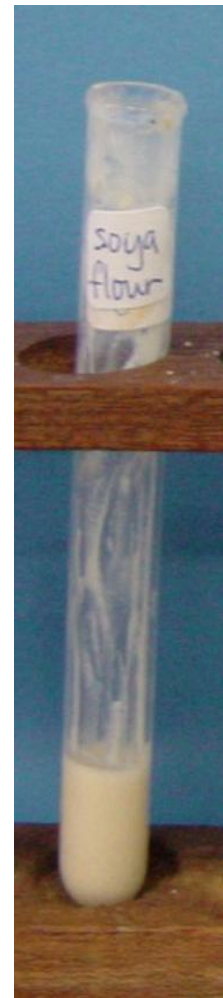
2



3





4



5

1 = oil layer remained, 5 = emulsion was formed.

- 
- pH plays a critical role in the ease of processing the emulsion and stabilizing the emulsion.
 - The pH of most lecithin is pH7.
 - Vinegar is an acid
 - ∴ Vinegar may inhibit the function of lecithin in egg yolk, which is the dominant factor in this experiment.

- 
- Few kinds of gram-negative bacteria will decompose phosphate
 - mainly found in soil but seldom found in the sea

- Our objective: How detergent may cause harm to our environment.
- Emulsion test was carried out for different brands of detergents. They have the similar cleansing property on dirt and oil.





- Sewage treatment may not have 100% efficiency in removing phosphate
- If large amount of phosphate is discharged, the sewage treatment system will be overloaded, and it will become ineffective.

∴ decrease the amount of phosphate discharged may increase the sewage treatment efficiency and reduce pollution.

Even very low concentrations as 0.1ppm of detergent will reduce the rate of oxygen dissolving in water by 50%.

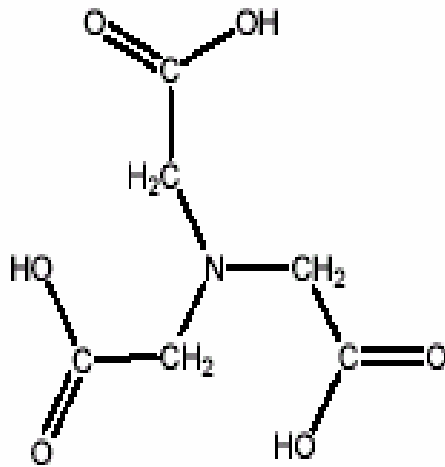


∴ Detergent strongly affect the oxygen supply to the aquatic life.

NITRILOTRIACETIC ACID

CAS No. 139-13-9

First Listed in the *Third Annual Report on Carcinogens*



- nitrilotriacetic acid emits toxic fumes of carbon monoxide, carbon dioxide, and nitrogen oxides
- It is used as a laundry detergent builder
- It is carcinogen
- It was suspended in the U.S. in 1971, this use resumed in the 1980s after phosphates were banned from detergents.

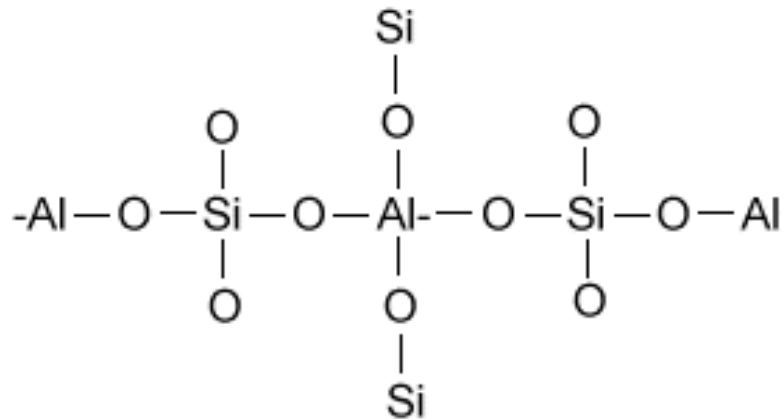











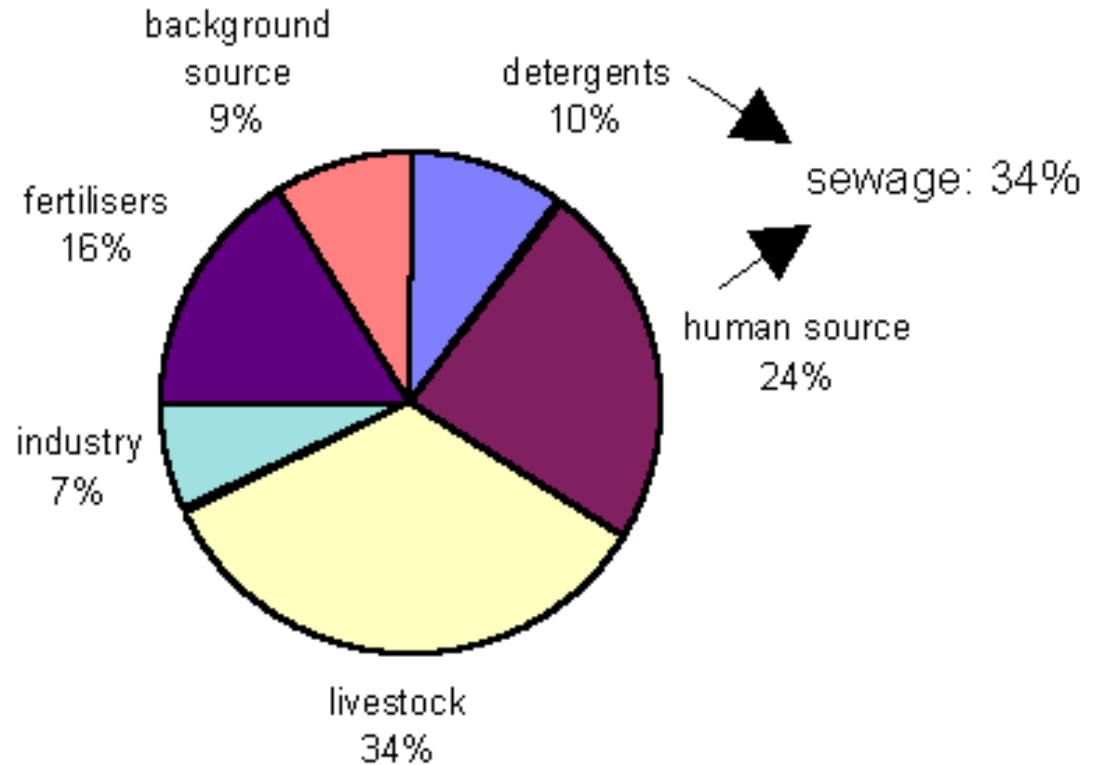
Figure 1: Basic Zeolite Structure

- Non-toxic to aquatic fauna and humans.
- Produces less toxic waste by-products when extracted.
- Generally accepted by EU Member States and consumers as efficient and acceptable alternative to STPP based ones.

Properties of the three main builders presently on the market	STPP	NTA	Zeolite
Removes hardness			
Reduces surfactant use			
Improves emulsification and dispersion			
Prevents redeposit ion			
Controls alkalinity			



Country	Response
European Union	Phosphate based formulations of detergents have to be labeled.
Switzerland	Phosphate based detergents were banned in 1987.
USA, Japan	Phosphate free detergents are widely use.



Detergent contributes about 10% of the total release of phosphate. However the scale of the total release of phosphate might be very large. Therefore, the phosphate released from detergent should also be considered.

Red tide in Hong Kong



Effects:

- Wiped out more than 1,500 tonnes of cultured fish stocks in the territory
- resulted in the temporary closure of some 20 bathing beaches

寄件者 : arthurlee@epd.gov.hk
 收件者 : khkh006@hotmail.com
 副本 : enquiry@epd.gov.hk
 主旨 : Re: E(03/2397) Phosphate content in detergent
 日期 : Mon, 26 May 2003 09:25:44 +0800

回覆 全部回覆 轉寄 刪除 置於資料夾...

Dear Ms. Ho,

Thanks for your enquiry. In Hong Kong, the Government does not impose any ban on the sale of phosphorus-containing detergent nor regulate the phosphorus content of detergent at the level of consumer product. The regulation of phosphorus mainly rests on the control of wastewater being discharged into the water environment. In short, the Government set out a set of standards * (known as 'Technical Memorandum - Standards for effluent discharged into Drainage and Sewerage Systems, Inland and Coastal Waters') , specifying what concentration of phosphorus are allowed to be discharged into what types of water body. The Environmental Protection Department will issue licences to the effluent dischargers, ensure they comply with the licences by regular inspection and take enforcement actions in case of non-compliance.

Phosphorus itself is a nutrient. Given that the amount does not exceed a certain limit, the natural environment is capable of re-cycling and re-using it without causing adverse effects or pollution -- this is commonly known as the 'assimilative capacity (自淨能力或同化能力)'. In setting the allowable concentrations of phosphorus or phosphate, we have taken into account the assimilative capacity or the sensitivity of the receiving water bodies, among other factors. In general, the more sensitive (i.e. lower the assimilative capacity) the water body, the more stringent the discharge standard will be -- which means a lower concentration of phosphorus / phosphate. For example, according to Technical Memorandum for a discharge of <=10 cubic meter/day :

- discharging to streams within water gathering ground ; total phosphorus not to exceed 1mg/L ;
- discharging to coastal waters in Tolo Harbour ; total phosphorus not to exceed 8 mg/L ;
- discharging to marine waters in Victoria Harbour ; total phosphorus not to exceed 10mg/L.

The Government does not impose any ban on the scale of phosphorus-containing detergent nor regulate the phosphorus content of detergent at the level of consumer product.

Discharging to streams within water gathering ground; total phosphorus not to exceed 1 mg/L.

Discharging to coastal waters in Tolo Harbour; total phosphorus not to exceed 8 mg/L

Discharging to marine waters in Victoria Harbour; total phosphorus not to exceed 10 mg/L

今日新聞
 牆紙免費下載
 遊戲特區

Total phosphorus

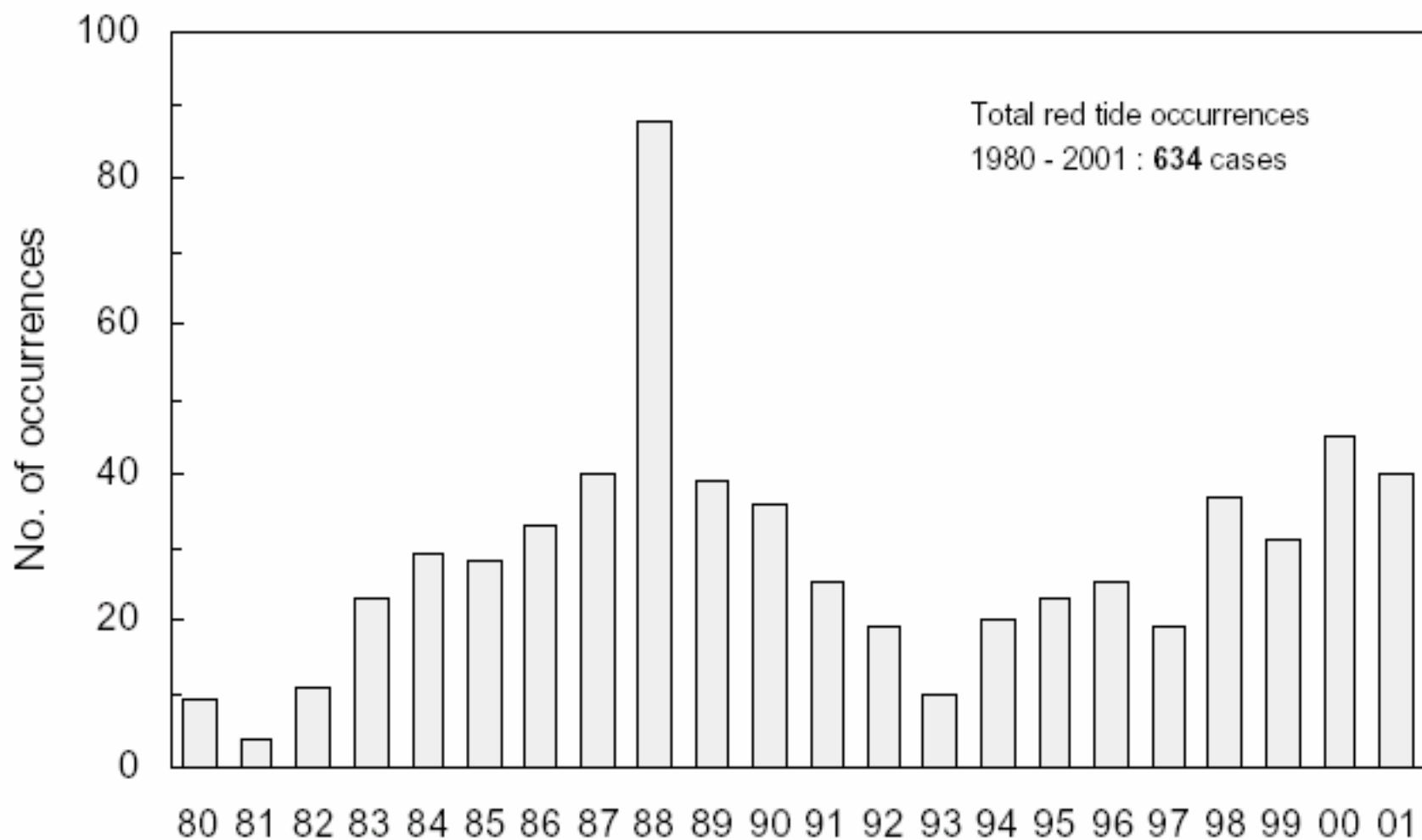
- orthophosphate
- polyphosphate (found in detergents)
- organic phosphate

polyphosphate $\xrightarrow{\text{acid}}$ orthophosphate

determined by
Molybdenum method &
precipitation method

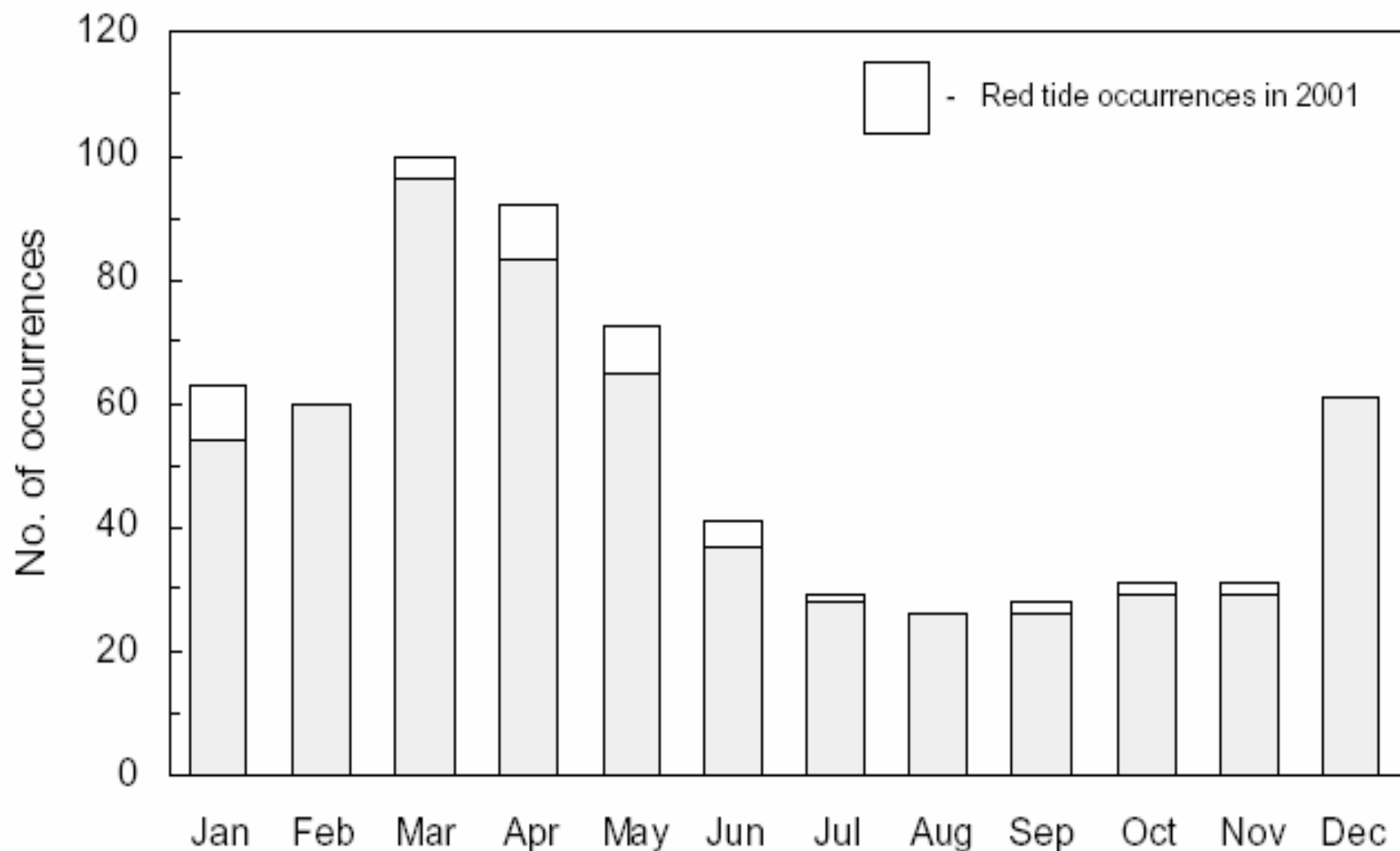
Occurrence of red tides in Hong Kong waters, 1980 - 2001

Yearly Distribution



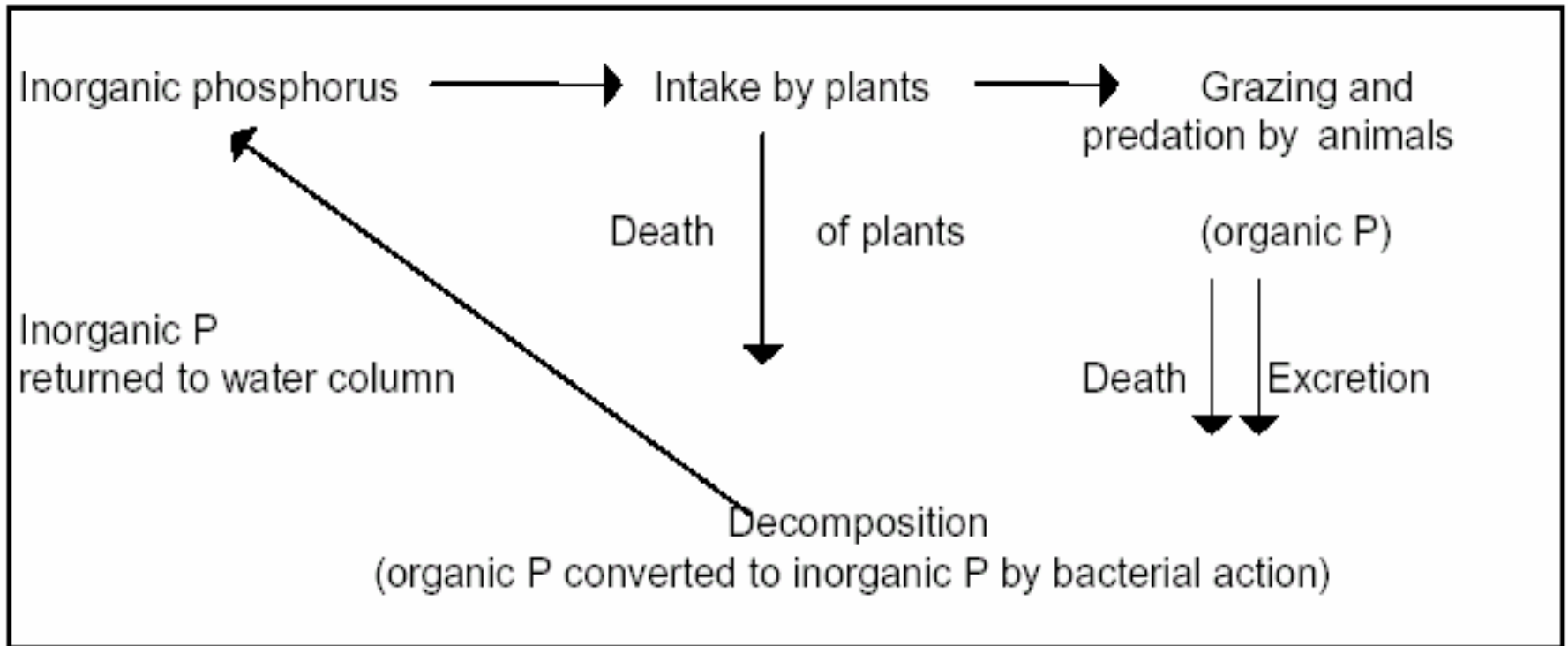
Occurrence of red tides in Hong Kong waters, 1980 - 2001

Monthly Distribution



Sources: Agriculture, Fisheries and Conservation Department and Environmental Protection Department

Phosphate Cycle



pH scale range 1 to 14

1+ most acidic
7 = neutral
14 = most alkaline

Water with a pH
of below 6.5 or
above 8.5 is
generally
unacceptable for
drinking water.

REACTION		
	14.0	● Household Lye
Extremely Alkaline	13.0	● Bleach
Extremely Alkaline	12.0	● Ammonia
Extremely Alkaline	11.0	● Milk of Magnesia
Strongly Alkaline	10.0	● Borax
Moderately Alkaline	9.0	● Baking Soda ● Sea Water
Slightly Alkaline	8.0	
Neutral	7.0	● Blood ● Distilled Water ● Milk ● Corn
Slightly Acid	6.0	
Moderately Acid	5.0	● Boric Acid ● Orange Juice
Strongly Acid	4.0	
Extremely Acid	3.0	● Vinegar ● Lemon Juice
Excessively Acid	2.0	
Very Extremely Acid	1.0	● Battery Acid
	0.0	

Common
Range
for Most
Natural
Waters