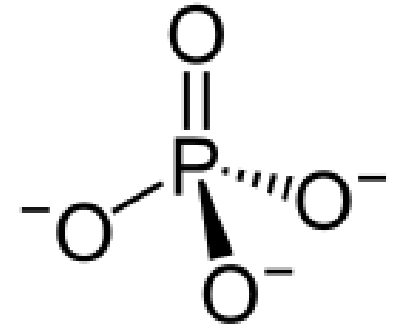




# **Estimation of inorganic phosphate in soft drinks**

# Phosphate in food:



- Phosphate occurs naturally in the form of **organic esters** in many kinds of food, including meat, potatoes, bread, and milk.
- Phosphate also used as a food additive (inorganic phosphate) as a preservative, a flavor or color enhancer, extend shelf life, and retain moisture.

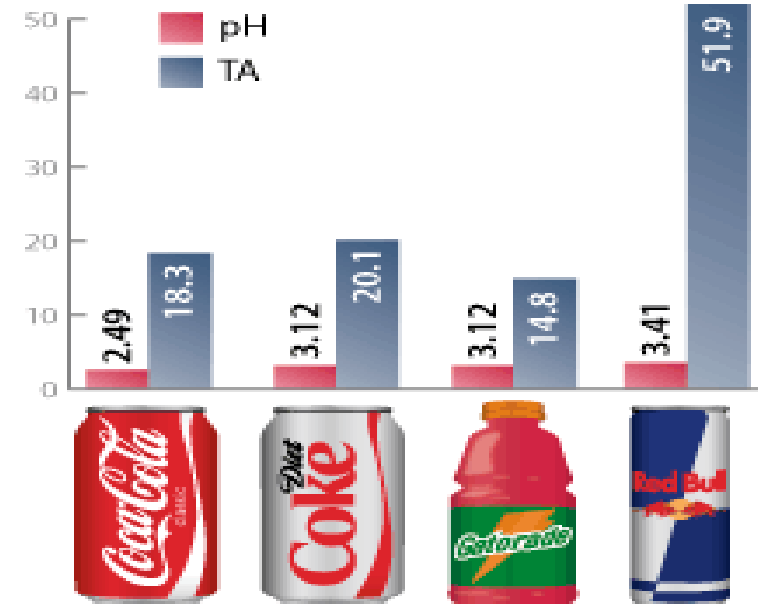
# Soft drinks:

- Soft drinks are complex mixtures containing a variety of substances such as colouring compounds, flavoring agents, acidifiers, sweeteners, preservatives, and caffeine.
- The most common **acidifier used in soft drinks is phosphoric** which gives a tangy taste in the mouth.
- Phosphoric acid can also act as a preservative, keeping the contents of the bottle fresh.



# Cola vs Vinegar:

- Due to the use of phosphoric acid, cola is actually more acid than vinegar which no body can drink straight. But a ton of sugar, dyes and flavoring are added to **mask the acidity**.



# Practical Part

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# Objective:

- Estimation of inorganic phosphate in soft drinks using ascorbic acid as reducing agent.

# Principle:

- Phosphoric acid is colorless, they **cannot be directly** determined using visible-light spectrophotometry, Instead we will quantitatively convert them into a colored substance, whose absorbance can be easily measured
- Inorganic phosphate reacts with ammonium molybdate in an acid solution (ammonium molybdate prepared in sulphoric acid in this experiment) to form phosphomolybdic acid.
- phosphomolybdic acid is then reduced by a reducing agent ( 3% ascorbic acid) to give **molybdenum blue a green/ blue color** that absorb at 650nm .

# Method:

- Set up a series of test tube as follows:

	Standard	Soft drink sample	Water	Ammonium molybdate	Ascorbic acid
<b>Blank</b>	----	----	2	0.5 ml	0.5 ml
<b>3 ppm</b>	2	----	---		
<b>4.5 ppm</b>	2	-----	---		
<b>6 ppm</b>	2	---	---		
<b>12 ppm</b>	2	---	---		
<b>15 ppm</b>	2	---	---		
<b>SD (try different concentration)</b>					



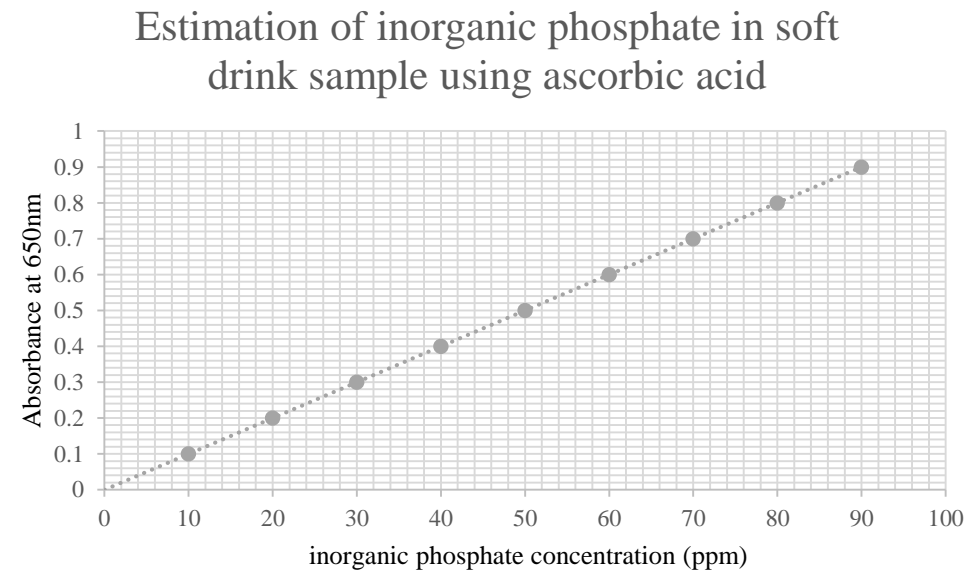
# Method cont':

- Mix thoroughly after each addition .
- Allow to stand for 10 min
- (a deep blue/green colour should develop).
- Measure the absorbance at 650 nm.

# Results:

- Plot a graph between absorbance and concentration of phosphate in various standard solutions and obtain the calibrated curve.
- From the curve determine the amount of phosphate in the test solution.

<b>Tube</b>	<b>Absorbance at 650nm</b>
Blank	
3 ppm	
4.5 ppm	
6 ppm	
12 ppm	
15 ppm	
<b>Sample</b>	



# Calculations:

- **Inorganic phosphate concentration**= dilution factor x concentration from the curve = ----- ppm
- Dilution factor= final volume / aliquot volume
- ➔ SD1=
- ➔ SD2=

# Home Work:

- Write down the informations in the picture by your hands (individually).

## WHAT HAPPENS ONE HOUR AFTER DRINKING A CAN OF COKE



- 1 FIRST 10 MINUTES**

10 teaspoons of sugar hit your system. (100% of your recommended daily intake.) You don't immediately vomit from the overwhelming sweetness because phosphoric acid cuts the flavor allowing you to keep it down.
- 2 20 MINUTES**

Your blood sugar spikes, causing an insulin burst. Your liver responds to this by turning any sugar it can get its hands on into fat. (There's plenty of that at this particular moment)
- 3 40 MINUTES**

Caffeine absorption is complete. Your pupils dilate, your blood pressure rises, as a response your liver dumps more sugar into your bloodstream. The adenosine receptors in your brain are now blocked preventing drowsiness.
- 4 45 MINUTES**

Your body ups your dopamine production stimulating the pleasure centers of your brain. This is physically the same way heroin works, by the way.
- 5 60 MINUTES**

The phosphoric acid binds calcium, magnesium and zinc in your lower intestine, providing a further boost in metabolism. This is compounded by high doses of sugar and artificial sweeteners also increasing the urinary excretion of calcium.
- 6 >60 MINUTES**

The caffeine's diuretic properties come into play. (It makes you have to pee.) It is now assured that you'll evacuate the bonded calcium, magnesium and zinc that was headed to your bones as well as sodium, electrolyte and water.
- 7 >60 MINUTES**

As the rave inside of you dies down you'll start to have a sugar crash. You may become irritable and/or sluggish. You've also now, literally, pissed away all the water that was in the Coke. But not before infusing it with valuable nutrients your body could have used for things like even having the ability to hydrate your system or build strong bones and teeth.