Sulfide simple test kit for industrial effluents
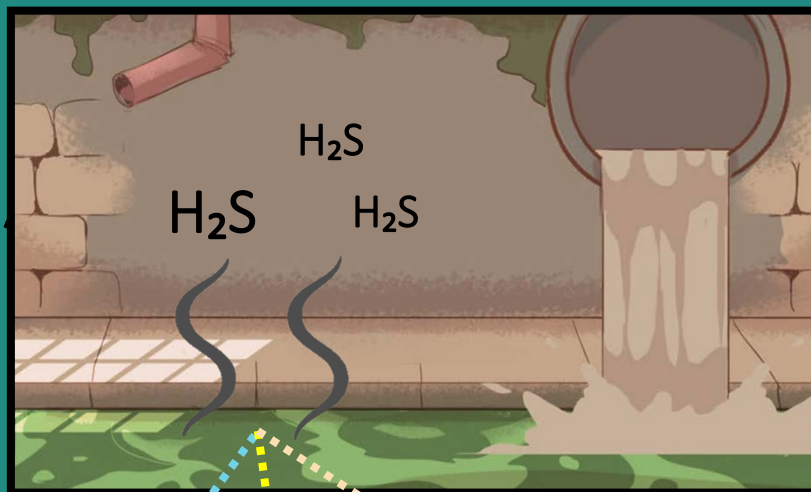
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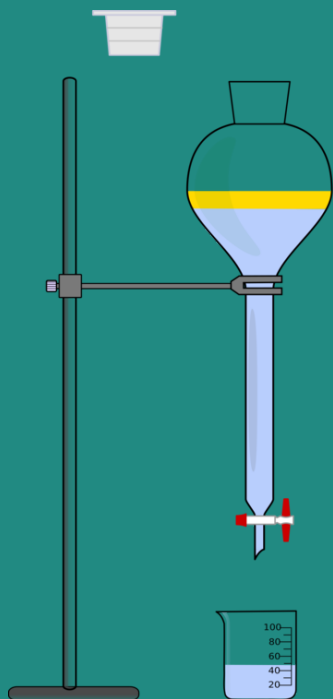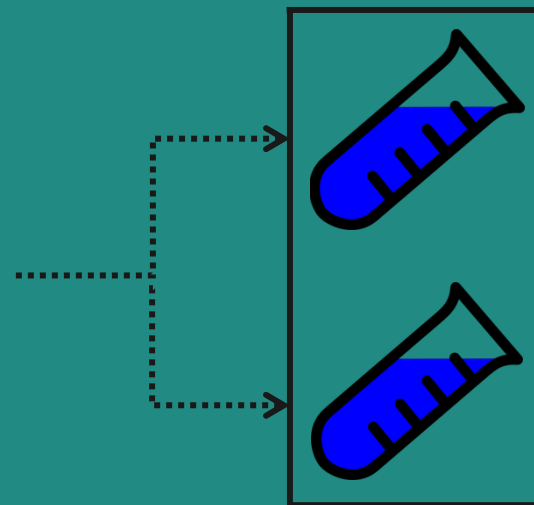
Background & Rationale of project

H$_2$S

H$_2$S   H$_2$S

2

Methods used for analysis H_2S in water

Iodometric method

Methylene blue method

Objectives

To invent a sulfide simple test kit for industrial effluents

To study the efficiency of the test kit
and compare to the standard methylene blue method

Expected Benefits

Sulfide simple test kit can be used to analyze sulfide for industrial effluents

Be able to compare capability of the test kit with the standard method

Project Framework

Standard Sulfide

+

Amine-Sulfuric solution

+

Ferric Chloride

Methylene Blue
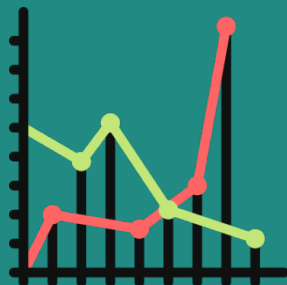
1 Create standard curve of sulfide solutions

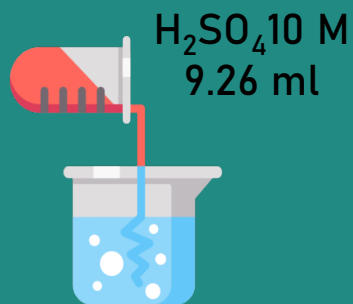**2** Invent the test kit

3 Test with water sample to compare capability

HS-C
HYDROGEN SULFIDE TEST KIT

Alka-Seltzer

https://chemglass.com/specmate-uv-vis-spectrophotometer
https://www.fondriest.com/hach-2537800.htm

Preparation of Amine-Sulfuric solution

H_2SO_4 10 M
9.26 ml

Distilled water 3.7 ml

5 g of *N,N*-dimethyl-
P-phenylenediamine oxalate

Adjust the volume
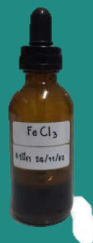to 18.52 ml

Amine-
Sulfuric solution

390 ml 1+1 H_2SO_4 10 M

Amine stock solution

Methodology

Reaction of the reagents

Standard Sulfide In various consentration 4.5 ml

+

Amine-Sulfuric solution 0.3 ml

+

$FeCl_3$ 0.1 ml

3-5 min →

Methylene blue

Measurement of absorbance

Methylene blue

→

Spectrophotometer at 664 nm
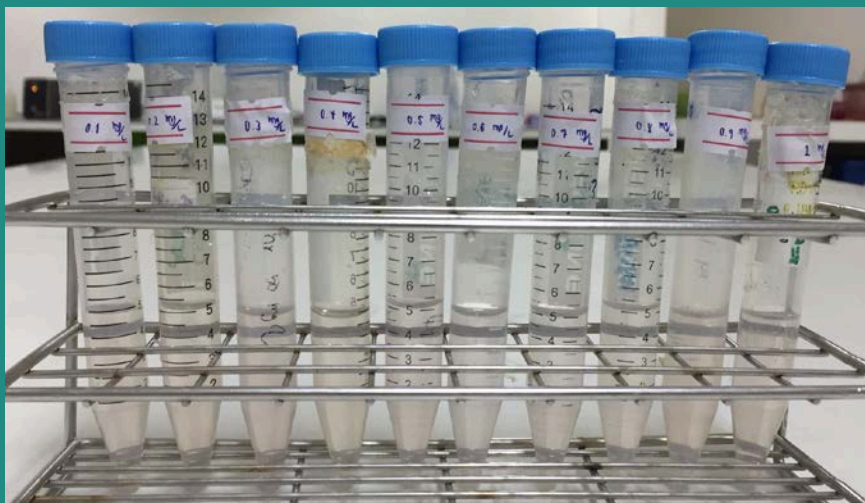
https://chemglass.com/specmate-uv-vis-spectrophotometer

Preparation of different sulfide concentrations

Addition of Amine-Sulfuric solution

0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1 mg/L

Addition of Ferric Chloride

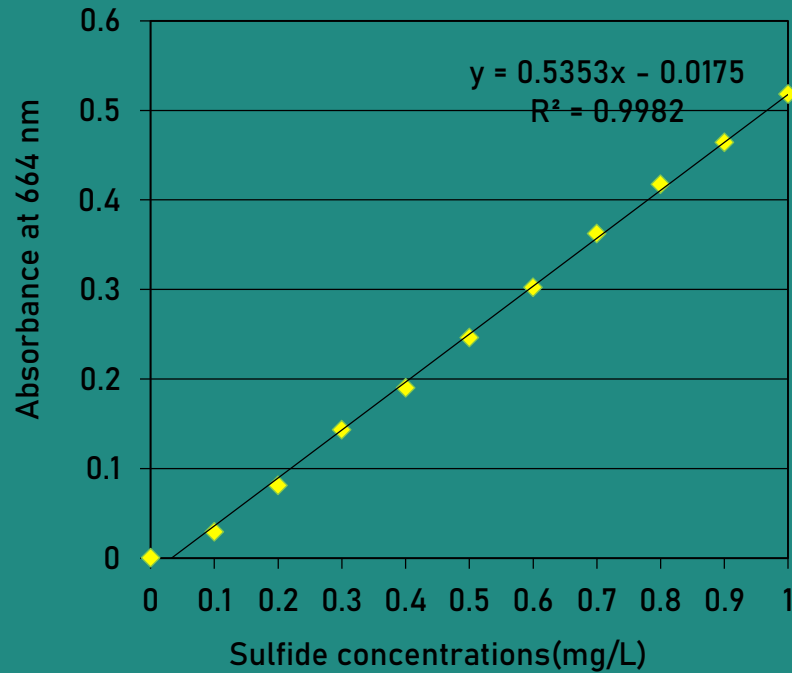0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1 mg/L

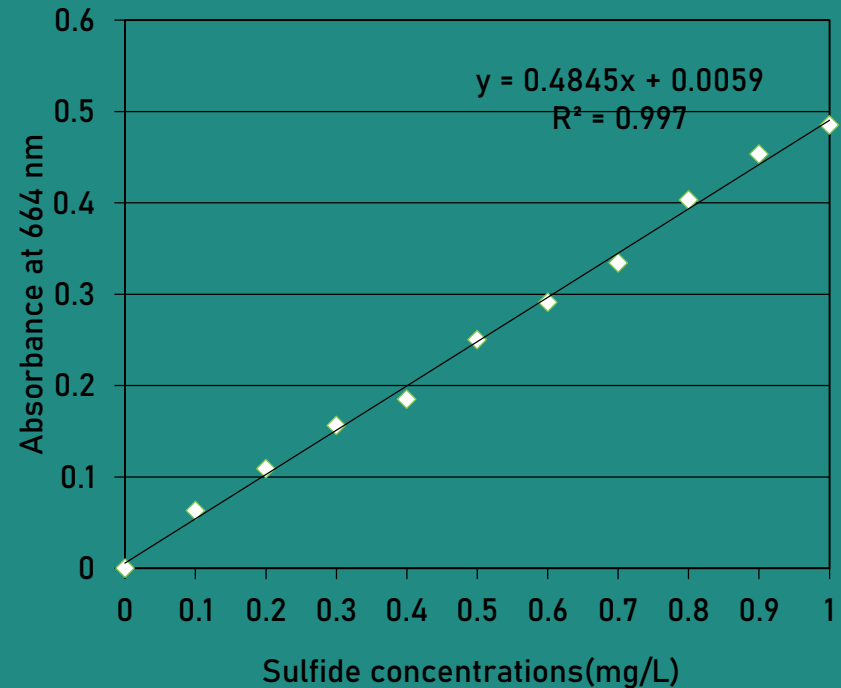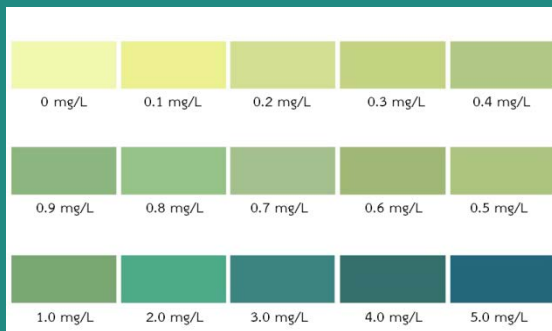Fig 2. Standard curve of absorbance at different sulfide concentrations

Fig 3. Standard curve of absorbance at different sulfide concentrations with addition of $NH_3H_2PO_4$

Capture photo to create the color bar

Invention of test kit

Test kit

Color bar
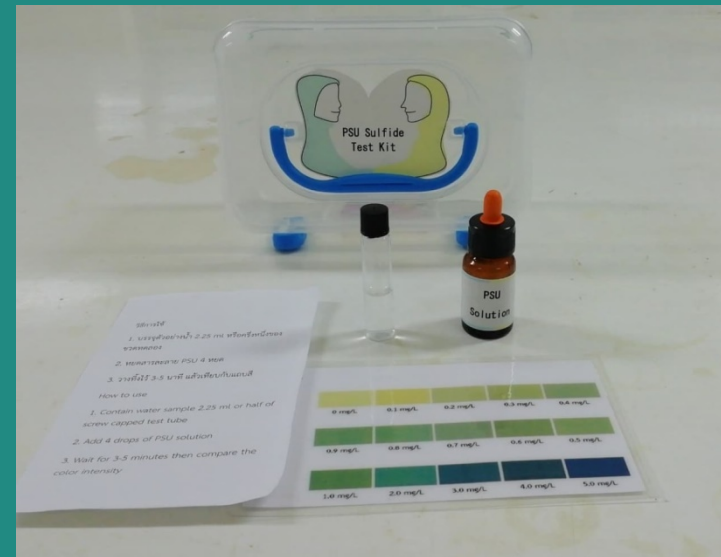
Testing of water sample

Water sample 2.25ml

+

PSU solution 0.2 ml

3-5 min

Methylene blue

0 mg/L	0.1 mg/L	0.2 mg/L	0.3 mg/L	0.4 mg/L
0.9 mg/L	0.8 mg/L	0.7 mg/L	0.6 mg/L	0.5 mg/L
1.0 mg/L	2.0 mg/L	3.0 mg/L	4.0 mg/L	5.0 mg/L
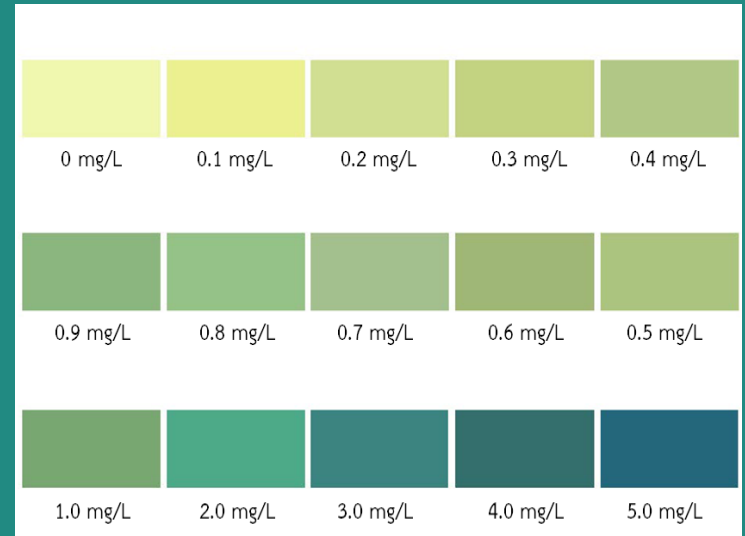
Table 1. Comparison of sample analysis results obtained from our test kit and the reference methods

Water samples from factories	Sulfide concentration (mg/L)		% Error
	Test kit (X)	Spectrophotometen (Y)	$\dfrac{|x - y|}{y} \times 100$
Concentrated latex 1	0.25±0.06	0.20±0.05	22.96
Concentrated latex 2	0.97±0.03	1.14±0.14	15.29
Concentrated latex 3	0.75±0.22	0.78±0.26	3.61
Concentrated latex 4	0.78±0.10	0.97±0.22	19.39
Concentrated latex 5	0.65±0.05	0.92±0.12	29.26
Pail oil mill 1	0.65±0.05	0.75±0.11	12.98
Pail oil mill 2	0.93±0.08	1.27±0.21	26.37
Canned fish 1	0.60±0.22	0.62±0.10	3.50
Canned fish 2	1.02±0.43	0.88±0.21	16.08
Frozen seafood	0.58±0.21	0.74±0.15	20.85
mean	$[S^{2-}] \leq 1$ mg/L (Thai industrial effluent standard, 2559)		17.03

Advantages of the developed test kit

✔ Reduce the number and amount chemical

❌ $NH_3H_2PO_4$, NaOH

✔ Can be used and the result is obtained on site.

❌

✔ Cost-effective

❌

✔ Convenient and faster

THANK YOU