

**สรุปผลโครงการจัดการระบบการจับเก็บสารเคมี ความปลอดภัยสารเคมี และการจัดการของเสีย
จากห้องปฏิบัติการ ศวภ.ตอ.**

ตามที่ งานมลพิษทางน้ำ และกากอุตสาหกรรม ได้ดำเนินการจัดทำโครงการจัดการระบบการจับเก็บสารเคมี ความปลอดภัยสารเคมี และการจัดการของเสียจากห้องปฏิบัติการของ ศวภ.ตอ. โดยมีวัตถุประสงค์ให้เจ้าหน้าที่ของ ศวภ.ตอ. มีความรู้ความเข้าใจในการจับเก็บสารเคมี และมีส่วนร่วมในการจัดการของเสียที่เกิดจากการวิเคราะห์ทดสอบได้อย่างถูกต้องตามหลักวิชาการ เพื่อให้เกิดความปลอดภัยต่อบุคลากรในห้องปฏิบัติการวิเคราะห์ทดสอบ โดยดำเนินการตามแผนฯ ดังนี้

๑. การจัดการของเสียจากห้องปฏิบัติการ รวบรวมรายการสารเคมีเสื่อมสภาพ และของเสียจากห้องปฏิบัติการ พร้อมประสานงาน/ส่งกำจัดกับหน่วยงานที่รับกำจัดฯ



๒. การจัดเก็บสารเคมีและความปลอดภัย

๒.๑ ตรวจสอบห้องเก็บสารเคมี/บำรุงรักษาตู้เก็บสารเคมีชนิดระเหย



๒.๒ รวบรวมข้อมูล MSDS ของสารเคมีแต่ละรายการ และจัดจำแนกความเป็นอันตรายของสารเคมีแต่ละชนิด

ที่	ชื่อสารเคมี	สูตร	ชื่อ	CAS-No.	สัญลักษณ์ GHS	คำเตือน	คำอธิบายอันตราย	คำอธิบายการปฐมพยาบาลเบื้องต้น
1	Potassium Dichromate	$K_2Cr_2O_7$	Merck	7778-30-9		<p>H314 Causes severe skin burns and eye damage.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H336 May cause drowsiness or dizziness.</p> <p>H350 May cause infertility or damage to the unborn child.</p> <p>H360FD May cause damage to the unborn child or breastmilk.</p> <p>H373 May cause respiratory irritation.</p> <p>H410 May cause severe damage to the environment.</p>	<p>P201 + P202 Attention (read the label carefully before use).</p> <p>P273 Do not release into the environment.</p> <p>P501 Dispose of contents and container according to local regulations.</p>	<p>First-aid steps: Wash skin thoroughly with water. Remove contaminated clothing. Seek medical attention if symptoms persist.</p>



๒.๓ จัดทำข้อมูล และเผยแพร่ให้เจ้าหน้าที่ที่เกี่ยวข้อง โดยมีผู้เข้าร่วมโครงการ จำนวน ๑๐ ราย



๒.๔ จัดเก็บสารเคมีให้เหมาะสมตามการจัดจำแนก รวมทั้งคัดแยกของเสียอันตรายจากการวิเคราะห์ทดสอบแต่ละพารามิเตอร์ โดยระบุข้อมูลลงบนฉลากอย่างชัดเจน



จากการจัดทำโครงการจัดการระบบการจัดเก็บสารเคมี ความปลอดภัยสารเคมี และการจัดการของเสียจากห้องปฏิบัติการของ ศวภ.ตอ. พบว่า เจ้าหน้าที่ของ ศวภ.ตอ. มีความรู้ความเข้าใจในการจัดเก็บสารเคมี สามารถจัดการของเสียที่เกิดจากการวิเคราะห์ทดสอบได้อย่างถูกต้องตามหลักวิชาการ ทำให้เกิดความปลอดภัยในการปฏิบัติงานวิเคราะห์ทดสอบ

โครงการจัดการระบบการจับเก็บสารเคมี
ความปลอดภัยสารเคมี
และการจัดการของเสียจากห้องปฏิบัติการ



ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

Eastern Industrial Pollutions Research and Warning Center

วัตถุประสงค์

1. เพื่อให้เจ้าหน้าที่ของ ศวภ.ตอ. มีความรู้ความเข้าใจในการจัดเก็บสารเคมี และมีส่วนร่วมในการจัดการของเสียที่เกิดจากการวิเคราะห์ทดสอบได้อย่างถูกต้องตามหลักวิชาการ
2. เพื่อให้เกิดความปลอดภัยต่อบุคลากรในห้องปฏิบัติการวิเคราะห์ทดสอบ

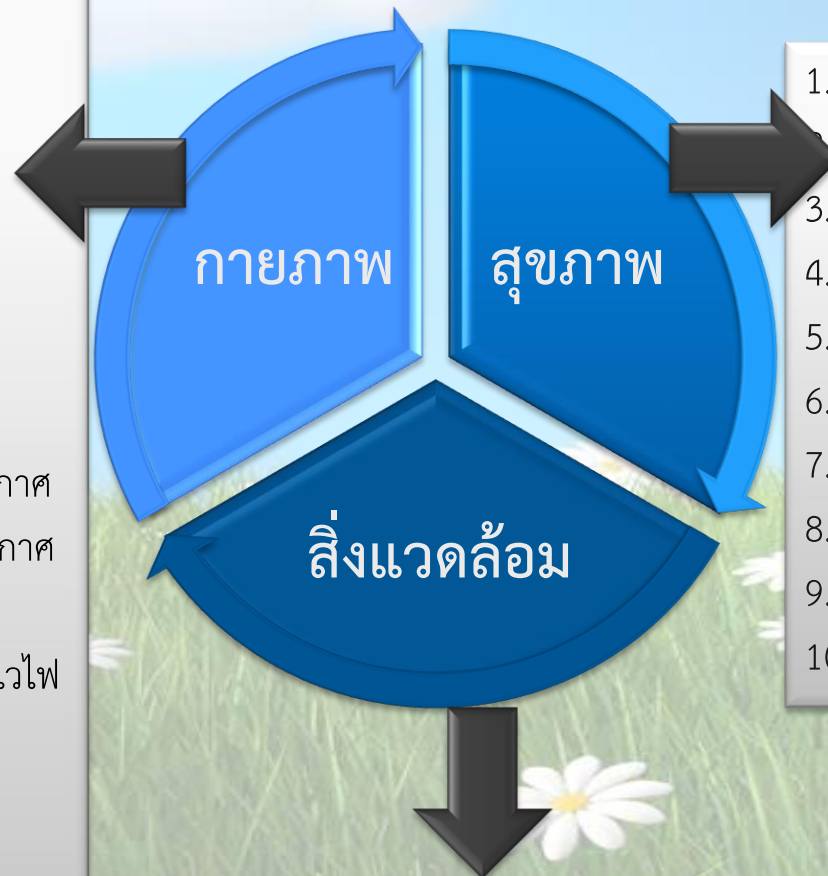


โครงการจัดการระบบการจัดเก็บสารเคมี ความปลอดภัยสารเคมี และการจัดการของเสียจากห้องปฏิบัติการของ ศวภ.ตอ.

ที่	การดำเนินการ	ระยะเวลา							หมายเหตุ
		ต.ค.-63	พ.ย.-63	ธ.ค.-63	ม.ค.-64	ก.พ.-64	มี.ค.-64	เม.ย.-64	
	การจัดการของเสียจากห้องปฏิบัติการ								
1	รวบรวมรายการสารเคมีเสื่อมสภาพ และของเสียจากห้องปฏิบัติการ	←→	→						ดำเนินการแล้ว
2	ประสานงาน/ส่งกำจัดกับหน่วยงานที่รับกำจัดฯ			←→	→				ดำเนินการแล้ว
	การจัดเก็บสารเคมีและความปลอดภัย								
1	ตรวจสอบห้องเก็บสารเคมี/บำรุงรักษาตู้เก็บสารเคมีชนิดระเหย					←→	→		ดำเนินการแล้ว
2	รวบรวมข้อมูล MSDS ของสารเคมีแต่ละรายการ				←→	→	→		ดำเนินการแล้ว
3	จัดจำแนกความเป็นอันตรายของสารเคมีแต่ละชนิด					←→	→		ดำเนินการแล้ว
4	จัดทำข้อมูล และเผยแพร่ให้เจ้าหน้าที่ที่เกี่ยวข้อง						←→	→	
5	จัดเก็บสารเคมีให้เหมาะสมตามการจัดจำแนก							←→	



ประเภทความเป็นอันตราย (Hazard class)



1. วัตถุระเบิด
2. ก๊าซไวไฟ
3. สารละลายไวไฟ
4. ก๊าซออกซิไดส์
5. ก๊าซภายใต้ความดัน
6. ของเหลวไวไฟ
7. ของแข็งไวไฟ
8. สารเคมีที่ทำปฏิกิริยาได้เอง
9. ของเหลวที่ลุกติดไฟได้เองในอากาศ
10. ของแข็งที่ลุกติดไฟได้เองในอากาศ
11. สารเคมีที่เกิดความร้อนได้เอง
12. สารเคมีที่สัมผัสแล้วให้ก๊าซไวไฟ
13. ของเหลวออกซิไดส์
14. ของแข็งออกซิไดส์
15. สารเปอร์ออกไซด์อินทรีย์
16. สารที่กัดกร่อนโลหะ
17. สารหรือสารผสมที่ระเบิดได้

1. ความเป็นพิษเฉียบพลัน
2. การกัดกร่อน/ระคายเคืองต่อผิวหนัง
3. การทำลายดวงตาอย่างรุนแรง/การระคายเคืองต่อดวงตา
4. การทำให้ไวต่อการกระตุ้นอาการแพ้ต่อระบบทางเดินหายใจหรือผิวหนัง
5. การกลายพันธุ์ของเซลล์สืบพันธุ์
6. ความสามารถในการก่อมะเร็ง
7. ความเป็นพิษต่อระบบสืบพันธุ์
8. ความเป็นพิษต่อระบบอวัยวะเป้าหมายอย่างเฉพาะเจาะจง การได้รับสัมผัสครั้งเดียว
9. ความเป็นพิษต่อระบบอวัยวะเป้าหมายอย่างเฉพาะเจาะจง การได้รับสัมผัสซ้ำ
10. ความเป็นอันตรายจากการสูดหรือการดูดออก

1. ความเป็นอันตรายต่อสิ่งแวดล้อมทางน้ำ
2. ความเป็นอันตรายต่อชั้นโอโซน



การจำแนกประเภทและการติดฉลาก
สารเคมีที่เป็นระบบเดียวกันทั่วโลก
(Globally Harmonized System of
Classification and Labelling of
Chemicals - GHS)

**GLOBALLY HARMONIZED
SYSTEM OF CLASSIFICATION
AND LABELLING OF
CHEMICALS (GHS)**

Eighth revised edition



UNITED NATIONS
New York and Geneva, 2019



ระบบ GHS

- ระบบ GHS มีพื้นฐานมาจากข้อตกลงระหว่างประเทศในการประชุมสหประชาชาติว่าด้วยสิ่งแวดล้อมและการพัฒนา (United Nation Conference for Environment and Development : UNCED) ในปี ค.ศ. 1992 (พ.ศ. 2535)
- มีการกำหนดมาตรการเพื่อพัฒนาการบริหารจัดการสารเคมีให้เป็นระบบเดียวทั่วโลก Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
- ระบบ GHS เป็นการจำแนก และสื่อสารความเป็นอันตรายของสารเคมี โดยแสดงในรูปแบบของฉลาก (Label) และเอกสารข้อมูลความปลอดภัยสารเคมี (Safety Data Sheet) สำหรับติดบนภาชนะบรรจุสารเคมี

ทำไมต้อง GHS ?

1. เพิ่มระดับการปกป้องสุขภาพมนุษย์และสิ่งแวดล้อมโดยจัดให้มีระบบสากลที่ครอบคลุมสำหรับการสื่อสารความเป็นอันตราย
2. เป็นแนวทางที่ได้รับการรับรองสำหรับประเทศที่ยังไม่มีระบบใด ๆ
3. ลดความต้องการในการทดสอบและประเมินสารเคมี
4. ช่วยเอื้ออำนวยให้การค้าสารเคมีระหว่างประเทศที่ได้มีการประเมินและระบุความเป็นอันตรายไว้อย่างถูกต้องเหมาะสมภายใต้มาตรฐานสากล





Safety Data Sheet คืออะไร

เอกสารที่แสดงข้อมูลของสารเคมีหรือเคมีภัณฑ์เกี่ยวกับลักษณะความเป็นอันตราย พิษ วิธีใช้ การเก็บรักษา การขนส่ง การกำจัด และการจัดการอื่นๆ เพื่อให้การดำเนินการเกี่ยวกับสารเคมีนั้นเป็นไปอย่างถูกต้องและปลอดภัย

USA : Material Safety Data Sheet (MSDS)

Malaysia : Chemical Safety Data Sheet (CSDS)

European Union (EU) : Safety Data Sheet (SDS)

สัญลักษณ์ในระบบ GHS

รูปสัญลักษณ์แสดงความเป็นอันตราย ตามระบบสากล GHS



สารไวไฟ



สารออกซิไดซ์



วัตถุระเบิด



ก๊าซบรรจุภายใต้ความดัน



สารกัดกร่อน



พิษเฉียบพลัน



อันตรายต่อสุขภาพ



ระคาย



อันตรายต่อสิ่งแวดล้อม

Health Hazard



- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

Flame



- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

Exclamation Mark



- Skin Sensitizer
- Narcotic Effects
- Irritant (skin and eye)
- Acute Toxicity (harmful)
- Respiratory Trace Irritant
- Hazardous to Ozone Layer (Non-Mandatory)

Gas Cylinder



- Gases Under Pressure

Corrosion



- Eye Damage
- Corrosive to Metals
- Skin Corrosion/Burns

Exploding Bomb



- Explosives
- Self-Reactives
- Organic Peroxides

Flame Over Circle



- Oxidizers

Environment (Non-Mandatory)



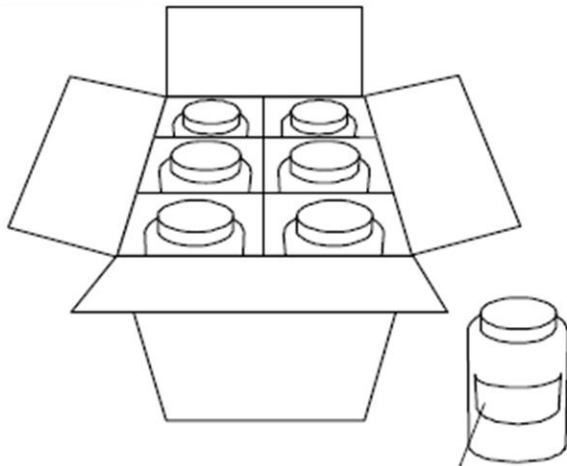
- Aquatic Toxicity


Skull and Crossbones

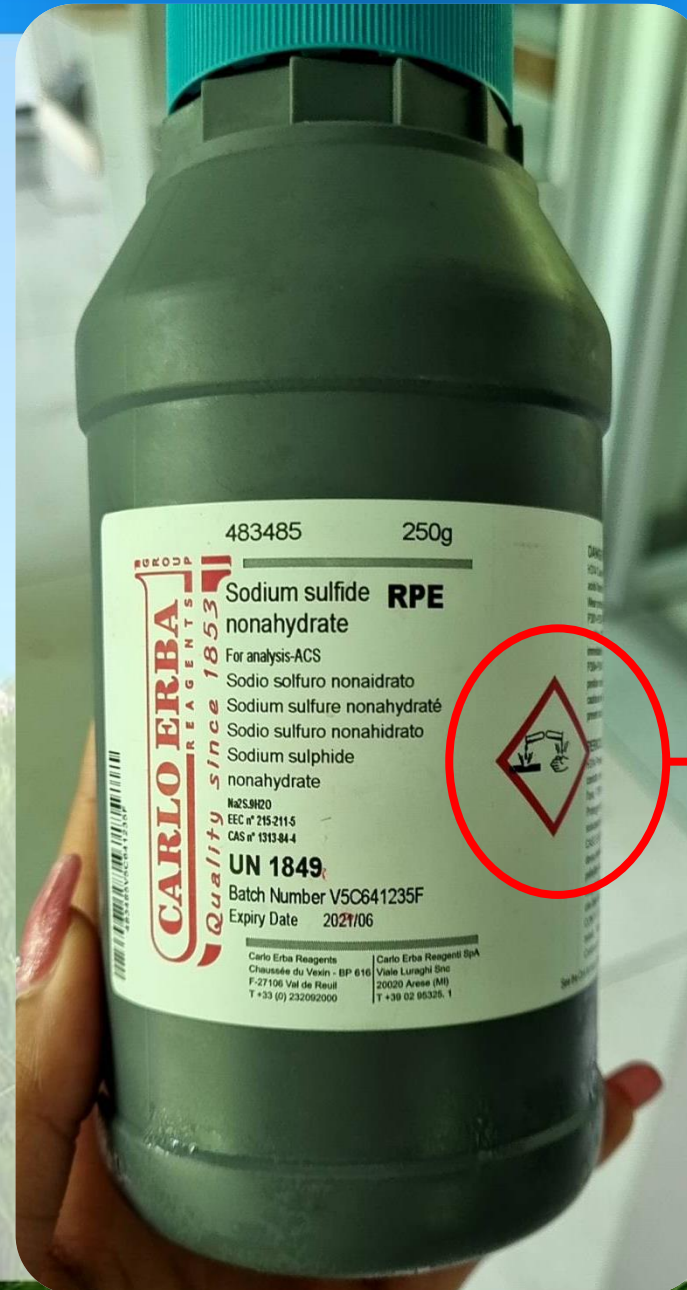


- Acute Toxicity (fatal or toxic)

การติดฉลากบนภาชนะบรรจุสารเคมี



BLAHZENE SOLUTION		Product identifier (see 1.4.10.5.2 (d))
	SIGNAL WORD (see 1.4.10.5.2 (a))	
	Hazard statements (see 1.4.10.5.2 (b))	
Precautionary statements (see 1.4.10.5.2 (c))		
Additional information as required by the competent authority as appropriate.		
Supplier identification (see 1.4.10.5.2 (e))		

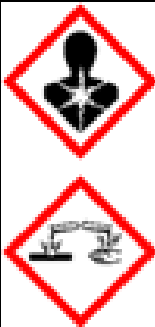







Corrosion



- Eye Damage
- Corrosive to Metals
- Skin Corrosion/Burns


สารเคมีสำหรับงานวิเคราะห์ทดสอบค่าสี (Color)





ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	Cat. No.	สัญลักษณ์		ประเภทอันตราย
					GHS	Un model regulation	
1	Platinum Cobalt Color Reference Solution	-	Merck	1.00246.0250		 UN 1789	H290 May be corrosive to metals. H350 May cause cancer. H412 Harmful to aquatic life with long lasting effects.
2	Sulfuric acid 95-97%	H ₂ SO ₄	Merck	1.00731.2500		 UN 1830	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage.
3	Sodium Hydroxide	NaOH	Merck	1.06498.1000		 UN 1823	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage




The End




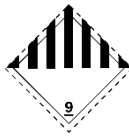



ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบบีโอดี (BOD)


ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Di-potassium hydrogen phosphate anhydrouse	K_2HPO_4	Merck	7758-11-4	-	-	-	-
2	Ammonium chloride	NH_4Cl	Merck	12125-02-9		-	H302 Harmful if swallowed. H319 Causes serious eye irritation.	P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contac tlenses, if present and easy to do. Continue rinsing.
3	Magnesium sulfate heptahydrate	$MgSO_4 \cdot H_2O$	Merck	10034-99-8	-	-	-	-
4	D - Glucose anhydrous	$C_6H_{12}O_6$	Merck	50-99-7	-	-	-	-
5	L - Glutamic acid	$C_5H_9NO_4$	HIMEDIA	56-86-0	-	-	-	-
6	Di-Sodium hydrogen phosphate haptahydrate	$Na_2HPO_4 \cdot 7H_2O$	Merck	7782-85-6	-	-	-	-

7	sodium azide	NaN ₃	Merck	26628-22-8	  	 UN 1687	H300 + H310 + H330 Fatal if swallowed, in contact with skin or if inhaled. H373 May cause damage to organs (Brain) through prolonged or repeated exposure if swallowed. H410 Very toxic to aquatic life with long lasting effects.	P262 Do not get in eyes, on skin, or on clothing. P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing. P302 + P352 + P310 IF ON SKIN: Wash with plenty of water. Immediately call a POISON CENTER/ doctor. P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor. P314 Get medical advice/ attention if you feel unwell.
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8	Iron (III) chloride hexahydrate	$\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$	Merck	10025-77-1	 	 UN 2582	<p>H290 May be corrosive to metals.</p> <p>H302 Harmful if swallowed.</p> <p>H315 Causes skin irritation.</p> <p>H318 Causes serious eye damage.</p>	<p>P234 Keep only in original packaging.</p> <p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear protective gloves/ eye protection/ face protection.</p> <p>P301 + P312 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>
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9	Manganese (II) sulphate monohydrate	$\text{MnSO}_4 \cdot \text{H}_2\text{O}$	VWR	10034-99-8	  	 UN number 3077	<p>H318 Causes serious eye damage.</p> <p>H373 May cause damage to organs (Brain) through prolonged or repeated exposure if inhaled.</p> <p>H411 Toxic to aquatic life with long lasting effects.</p>	<p>P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.</p> <p>P273 Avoid release to the environment.</p> <p>P280 Wear eye protection/ face protection.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P314 Get medical advice/ attention if you feel unwell.</p> <p>P391 Collect spillage.</p>
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10	Sodium iodide	NaI	VWR	7681-82-5		-	H372 Causes damage to organs through prolonged or repeated exposure.	<p>P260 Do not breathe dust/fume/gas/mist/vapours/spray.</p> <p>P264 Wash ... thoroughly after handling.</p> <p>P270 Do not eat, drink or smoke when using this product.</p> <p>P314 Get medical advice/attention if you feel unwell.</p> <p>P501 Dispose of contents/container</p>
11	potassium di hydrogen phosphate	KH ₂ PO ₄	Merck	7778-77-0	-	-	-	-








12	Calcium chloride	CaCl ₂	Merck	10043-52-4		-	<p>H319 Causes serious eye irritation.</p> <p>P264 Wash skin thoroughly after handling. P280 Wear eye protection/ face protection. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313 If eye irritation persists: Get medical advice/ attention.</p>
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ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบคลอไรด์ (Chloride)






ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Potassium Chromate	K_2CrO_4	BDH	7789-00-6		-	<p>H350 May cause cancer.</p> <p>H340 May cause genetic defects.</p> <p>H317 May cause an allergic skin reaction.</p>	<p>P201 Obtain special instructions before use.</p> <p>P280 Wear protective gloves/protective clothing/eye protection/face protection.</p> <p>P273 Avoid release to the environment.</p> <p>P302+P352 IF ON SKIN: Wash with plenty of water/</p> <p>P308+P313 IF exposed or concerned: Get medical advice/attention.</p>

2	Silver Nitrate	AgNO ₃	VMR	7761-88-8	  	 UN 1493	<p>H272 May intensify fire; oxidizer.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H410 Very toxic to aquatic life with long lasting effects.</p>	<p>Precautionary statement(s):</p> <p>P210: Keep away from heat/sparks/open flames/hot surfaces. – No smoking.</p> <p>P220: Store away from clothing and combustible materials.</p> <p>P221: Take any precaution to avoid mixing with combustibles.</p> <p>P260: Do not breathe dust.</p> <p>P264: Wash hands thoroughly after handling.</p> <p>P273: Avoid release to the environment.</p> <p>P280: Wear protective gloves/protective clothing/eye protection/face protection.</p> <p>P310: Immediately call a POISON CENTER or doctor.</p> <p>P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.</p> <p>P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes.</p> <p>Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P363: Wash contaminated clothing before reuse.</p> <p>P370+P378: In case of fire: Use water to extinguish.</p> <p>P391: Collect spillage.</p> <p>P405: Store locked up.</p>
3	Sodium Chloride	NaCl	Merck	7647-14-5	-	-	-	-




ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบซีโอดี (COD)



ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Potassium Dichromate	K ₂ Cr ₂ O ₇	Merck	7778-50-9	    	  UN 3086	<p>H272 May intensify fire; oxidizer.</p> <p>H301 Toxic if swallowed.</p> <p>H312 Harmful in contact with skin.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H330 Fatal if inhaled.</p> <p>H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.</p> <p>H335 May cause respiratory irritation.</p> <p>H340 May cause genetic defects.</p> <p>H350 May cause cancer.</p> <p>H360FD May damage fertility. May damage the unborn child.</p> <p>H372 Causes damage to organs (Cardio-vascular system) through prolonged or repeated exposure if inhaled.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.</p> <p>P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>



							H410 Very toxic to aquatic life with long lasting effects.	
2	Silver sulfate	Ag ₂ SO ₄	Merck	10294-26-5	 	 UN 3077	H318 Causes serious eye damage. H410 Very toxic to aquatic life with long lasting effects.	P273 Avoid release to the environment. P280 Wear eye protection. Response P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
3	Mercury (II) sulfate	HgSO ₄	Merck	7783-35-9	  	 UN 1645	H300 + H310 + H330 Fatal if swallowed, in contact with skin or if inhaled. H373 May cause damage to organs (Kidney) through prolonged or repeated exposure. H410 Very toxic to aquatic life with long lasting effects.	P262 Do not get in eyes, on skin, or on clothing. P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing. P302 + P352 + P310 IF ON SKIN: Wash with plenty of water. Immediately call a POISON CENTER/ doctor. P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor. P314 Get medical advice/ attention if you feel unwell.
4	Potassium Hydrogen Phthalate	KHP	Merck	877-24-7	-	-	-	-
5	Ammonium iron (II) sulfate hexahydrate	FAS	Merck	7783-85-9	-	-	-	-

6	Ferroun indicator		AIDRICH	-	-	-	H412 Harmful to aquatic life with long lasting effects.	-
7	Sulfuric Acid 95-97%	H ₂ SO ₄	Merck	7664-93-9		 UN 1830	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage.	P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. Response P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.
8	1,10-Phenanthroline monohydrate		Merck	5144-89-8	 	 UN 2811	H301 Toxic if swallowed. H410 Very toxic to aquatic life with long lasting effects.	P264 Wash skin thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P273 Avoid release to the environment. P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor. P391 Collect spillage. P405 Store locked up.








ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบสี (Color)








ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Platinum Cobalt Color Reference Solution	-	Merck	-	 	 UN 1789	<p>H290 May be corrosive to metals.</p> <p>H350 May cause cancer.</p> <p>H412 Harmful to aquatic life with long lasting effects.</p>	<p>P201 Obtain special instructions before use.</p> <p>P202 Do not handle until all safety precautions have been read and understood.</p> <p>P234 Keep only in original packaging.</p> <p>P273 Avoid release to the environment.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p>




2	Sulfuric acid 95-97%	H ₂ SO ₄	Merck	7664-93-9	  UN 1830	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
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3	Sodium Hydroxide	NaOH	Merck	1310-73-2	  UN 1823	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
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ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบโครเมียมเฮกซะวาเลนทีนตัวอย่างกากตะกอน

ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Potassium Dichromate	K ₂ Cr ₂ O ₇	Merck	7778-50-9	    	  UN 3086	<p>H272 May intensify fire; oxidizer.</p> <p>H301 Toxic if swallowed.</p> <p>H312 Harmful in contact with skin.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H330 Fatal if inhaled.</p> <p>H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.</p> <p>H335 May cause respiratory irritation.</p> <p>H340 May cause genetic defects.</p> <p>H350 May cause cancer.</p> <p>H360FD May damage fertility. May damage the unborn child.</p> <p>H372 Causes damage to organs (Cardio-vascular system) through prolonged or repeated exposure if</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.</p> <p>P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>








2	Nitric acid 65%	HNO ₃	Merck	-	  	 	<p>H272 May intensify fire; oxidizer.</p> <p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H331 Toxic if inhaled.</p> <p>EUH071 Corrosive to the respiratory tract.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
3	Sulfuric acid 95-97%	H ₂ SO ₄	Merck	7664-93-9			<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>




4	Sodium Hydroxide	NaOH	Merck	1310-73-2		 UN 1823	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
5	Sodium Carbonate	Na ₂ CO ₃	Merck	497-19-8		-	<p>H319 Causes serious eye irritation.</p>	<p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear eye protection/ face protection.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P337 + P313 If eye irritation persists: Get medical advice/ attention.</p>






6	1,5 Diphenylcarbazine	-	Merck	140-22-7		-	<p>H315 Causes skin irritation.</p> <p>H319 Causes serious eye irritation.</p>	<p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear protective gloves/ eye protection/ face protection.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P332 + P313 If skin irritation occurs: Get medical advice/ attention.</p> <p>P337 + P313 If eye irritation persists: Get medical advice/ attention.</p>
7	Acetone	CH ₃ COCH ₃	Merck	67-64-1	 	 UN 1090	<p>H225 Highly flammable liquid and vapor.</p> <p>H319 Causes serious eye irritation.</p> <p>H336 May cause drowsiness or dizziness.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P233 Keep container tightly closed.</p> <p>P240 Ground and bond container and receiving equipment.</p> <p>P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.</p> <p>P242 Use non-sparking tools.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>
8	Magnesium Chloride Hexahydrate	MgCl ₂ ·6H ₂ O	Merck	7791-18-6	-	-	-	-








9	di-Potassium hydrogen phosphate	K_2HPO_4	VWR	7758-11-4	-	-	-	-
10	Potassium dihydrogen phosphate	KH_2PO_4	Merck	7778-77-0	-	-	-	-

ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบโครเมียมเฮกซะวาเลนซ์ในตัวอย่างน้ำ/น้ำเสีย



ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Potassium Dichromate	K ₂ Cr ₂ O ₇	Merck	7778-50-9	    	  UN 3086	<p>H272 May intensify fire; oxidizer.</p> <p>H301 Toxic if swallowed.</p> <p>H312 Harmful in contact with skin.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H330 Fatal if inhaled.</p> <p>H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.</p> <p>H335 May cause respiratory irritation.</p> <p>H340 May cause genetic defects.</p> <p>H350 May cause cancer.</p> <p>H360FD May damage fertility. May damage the unborn child.</p> <p>H372 Causes damage to organs (Cardio-vascular system) through prolonged or repeated exposure if inhaled.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.</p> <p>P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>



							H410 Very toxic to aquatic life with long lasting effects.	
2	Ortho-Phosphoric acid 85%	H ₃ PO ₄	Merck	7664-38-2	 	 UN 1805	H290 May be corrosive to metals. H302 Harmful if swallowed. H314 Causes severe skin burns and eye damage.	P234 Keep only in original packaging. P270 Do not eat, drink or smoke when using this product. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection. P301 + P312 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.






3	Sulfuric acid 95-97%	H ₂ SO ₄	Merck	7664-93-9		 UN 1830	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned:</p>
4	Sodium Hydroxide	NaOH	Merck	1310-73-2		 UN 1823	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned:</p>
5	1,5 Diphenylcarbazine	-	Merck	140-22-7		-	<p>H315 Causes skin irritation.</p> <p>H319 Causes serious eye irritation.</p>	<p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear protective gloves/ eye protection/ face protection.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>




6	Acetone	CH ₃ COCH ₃	Merck	67-64-1	 	 UN 1090	<p>H225 Highly flammable liquid and vapor.</p> <p>H319 Causes serious eye irritation.</p> <p>H336 May cause drowsiness or dizziness.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P233 Keep container tightly closed.</p> <p>P240 Ground and bond container and receiving equipment.</p> <p>P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.</p> <p>P242 Use non-sparking tools.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>
7	Ammonia Solution (Ammonium hydroxide)25%	NH ₄ OH	Merck	-	  	 UN 1823	<p>H314 Causes severe skin burns and eye damage.</p> <p>H335 May cause respiratory irritation.</p> <p>H400 Very toxic to aquatic life.</p>	<p>P273 Avoid release to the environment.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.</p>
8	Ammonium Sulphate	(NH ₄) ₂ SO ₄	KEMAUS	7783-20-2	-	-	-	-




ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ Cyanide




ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Sulfuric acid 95-97%	H ₂ SO ₄	Merck	7664-93-9		 UN 1830	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>




2	Sodium hydroxide	NaOH	Merck	1310-73-2		 UN 1823	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
3	Magnesium Chloride hexahydrate	MgCl ₂ .6H ₂ O	Merck	7791-18-6	-	-	-	-







4	Chloramine-T trihydrate	$C_7H_7ClNaNO_2S \cdot 3H_2O$	Merck	7080-50-4	  	  UN 2928	<p>H302 Harmful if swallowed.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.</p> <p>EUH031 Contact with acids liberates toxic gas.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.No smoking.</p> <p>P240 Ground/bond container and receiving equipment.</p> <p>Response</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>Storage</p> <p>P403 + P233 Store in a well-ventilated place. Keep container tightly closed.</p>
5	Barbituric acid	$C_4H_4N_2O_3$	Merck	67-52-7	-	-	-	-

6	Pyridine	C_6H_5N	VWR	110-86-1	 	 UN 1282	<p>H225 Highly flammable liquid and vapour.</p> <p>H302 + H312 + H332 Harmful if swallowed, in contact with skin or if inhaled.</p> <p>H315 Causes skin irritation.</p> <p>H319 Causes serious eye irritation.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.No smoking.</p> <p>P240 Ground/bond container and receiving equipment.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>Storage</p> <p>P403 + P233 Store in a well-ventilated place. Keep container tightly closed.</p>
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7	Hydrochloric acid 37%	HCl	Merck	-	 	 UN 1789	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage. H335 May cause respiratory irritation.	P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.
8	Sodium acetate trihydrate	CH ₃ COONa*3H ₂ O	VWR	6131-90-4	-	-	-	-







9	Acetic acid (glacial) 100%	CH ₃ COOH	Merck	64-19-7	 	 UN 2789	H226 Flammable liquid and vapour. H314 Causes severe skin burns and eye damage.	P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P233 Keep container tightly closed. P240 Ground and bond container and receiving equipment. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection. P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
10	Cyanide Standard Solution 1000 mg/L	-	Merck	1.19533.0500	-	-	-	-





11	Cyanide Standard Solution 100µg /mL		Accu	-	 	 UN 1824	<p>H302 Harmful if swallowed.</p> <p>H332 Harmful if inhaled.</p> <p>H318 Causes serious eye damage. H314 Causes severe skin burns</p>	<p>Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. (P338)\nSkin contact: Immediately flush skin with plenty amounts of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Thoroughly wash (or discard) clothing and shoes before reuse. (P360)\nIngestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Give victim a glass of water a little at a time. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, lower head below waist to prevent fluid from entering the lungs. (P331)\nStore in a tightly closed container. (P404)\nStore in</p>
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12	Amidosulfuric acid (Sulfamic acid)		Merck	5329-14-6		 UN 2967	<p>H315 Causes skin irritation.</p> <p>H319 Causes serious eye irritation.</p> <p>H412 Harmful to aquatic life with long lasting effects.</p>	<p>P273 Avoid release to the environment.</p> <p>Response</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>
13	Lead carbonate	PbCO ₃	Merck	598-63-0	  	 UN 2291	<p>H302 + H332 Harmful if swallowed or if inhaled.</p> <p>H360Df May damage the unborn child.</p> <p>Suspected of damaging fertility.</p> <p>H373 May cause damage to organs through prolonged or repeated exposure.</p> <p>H410 Very toxic to aquatic life with long lasting effects.</p>	<p>P201 Obtain special instructions before use.</p> <p>P202 Do not handle until all safety precautions have been read and understood.</p> <p>P273 Avoid release to the environment.</p> <p>P301 + P312 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell.</p> <p>P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p>

ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ Formaldehyde




ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Ammonium Acetate	$\text{CH}_3\text{COONH}_4$	Merck	631-61-8	-	-	-	
2	Acetyl Acetone	$\text{C}_5\text{H}_8\text{O}_2$	Carlo	-	  	  UN 2310	<p>H226 Flammable liquid and vapour.</p> <p>H302 Harmful if swallowed.</p> <p>H311 + H331 Toxic in contact with skin or if inhaled.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.</p> <p>P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].</p> <p>P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.</p> <p>P311 Call a POISON CENTER/doctor.</p> <p>P330 Rinse mouth.</p> <p>P361+P364 Take off immediately all contaminated clothing and wash it before reuse.</p> <p>P403+P233 Store in a well-ventilated place. Keep container tightly closed.</p>






3	Acetic Acid (Glacial) 100%	CH ₃ COOH	Merck	64-19-7	 	 UN 2789	H226 Flammable liquid and vapour. H314 Causes severe skin burns and eye damage.	P210 Keep away from heat. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.
4	Sodium Sulfite Anhydrous	Na ₂ O ₃ S	VWR	7757-83-7	-	-	-	
5	Hydrochloric acid 37%	HCl	Merck	1.13386.2500	 	 UN 1789	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage. H335 May cause respiratory irritation.	P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.





6	37% Formaldehyde Solution	CH ₂ O	Merck	-	  	 UN 2209	<p>H350 May cause cancer.</p> <p>H301 + H311 + H331 Toxic if swallowed, in contact with skin or if inhaled.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H335 May cause respiratory irritation.</p> <p>H341 Suspected of causing genetic defects.</p> <p>H370 Causes damage to organs (Eyes).</p>	<p>P201 Obtain special instructions before use.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.</p>
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7	37% Formaldehyde Solution	CH ₂ O	Carlo	-	   	 UN 2209	<p>H301+H311+H331 Toxic if swallowed, in contact with skin or if inhaled.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H341 Suspected of causing genetic defects.</p> <p>H350 May cause cancer.</p> <p>Route of exposure: Inhalation.</p> <p>H370 Causes damage to the central nervous system and the visual organs.</p> <p>Route of exposure: Inhalation.</p> <p>H335 May cause respiratory irritation.</p>	<p>Keep away from flames and hot surfaces.</p> <p>– No smoking.</p> <p>Wear protective gloves/protective clothing/eye protection/face protection.</p> <p>If swallowed: Rinse mouth. Do NOT induce vomiting.</p> <p>If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.</p> <p>IF INHALED: Remove person to fresh air and keep comfortable for breathing.</p> <p>If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.</p> <p>Continue rinsing.</p> <p>IF exposed or concerned: Get medical advice/attention.</p> <p>Take off immediately all contaminated clothing and wash it before reuse.</p> <p>Store in a well-ventilated place. Keep container tightly closed.</p>
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ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบโลหะหนัก





ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	Cat. No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	hydrochloric acid	HCl	Merck	7647-01-0	 	 UN 1789	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage. H335 May cause respiratory irritation.	P234 Keep only in original packaging. P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray. P264 Wash skin thoroughly after handling. P271 Use only outdoors or in a well-ventilated area. P302 + P352 IF ON SKIN: Wash with plenty of water. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.









2	nitric acid	HNO ₃	Merck	7697-37-2	  	 	<p>H272 May intensify fire; oxidiser</p> <p>H290 May be corrosive to metals</p> <p>H314 Causes severe skin burns and eye damage</p> <p>H331 Toxic if inhaled</p>	<p>P220 Keep/store away from combustible materials.</p> <p>P260 Do not breathe mist/vapours/spray.</p> <p>P280 Wear protective gloves/protective clothing/eye protection/face protection.</p> <p>P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].</p> <p>P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P310 Immediately call a POISON CENTER/doctor.</p>
						UN 2031		








3	Multi elements standard	-	accustandard	-	  	 UN 2031	<p>H290 - May be corrosive to metals.</p> <p>H302 - Harmful if swallowed. (Acute toxicity, oral, category 4)</p> <p>H314 - Causes skin burns. (Skin corrosion/irritation, category 1)</p> <p>H318 - Causes serious eye damage. (Eye damage/irritation, category 1)</p> <p>H350 - This product is or contains a component that is classified (ACGIH, IARC, NTP, OSHA) as a cancer hazard. (Carcinogenicity, category 1A)</p> <p>H360, H350 - California Proposition 65 Warning: This product contains a</p>	<p>P201 Obtain special instructions before use.</p> <p>P273 Avoid release to the environment.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
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ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบปรอท

ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Potassium permanganate	KMnO ₄	Merck	7722-64-7		 UN 1490	H314 Causes severe skin burns and eye damage. H361d Suspected of damaging the unborn child.	P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray. P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection. P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.



2	Potassium persulfate	$K_2S_2O_8$	PanReac	7727-21-1	  	 UN 1492	H272 May intensify fire; oxidiser. H302 Harmful if swallowed. H315 Causes skin irritation. H317 May cause an allergic skin reaction.	-
3	Sodium chloride	NaCl	Merck	7647-14-5	-	-	-	




4	hydroxylamonium sulfate	$(\text{HONH}_3)_2\text{SO}_4$	Merck	10039-54-0	   	 UN 2865	<p>H290 May be corrosive to metals.</p> <p>H302 + H312 Harmful if swallowed or in contact with skin.</p> <p>H315 Causes skin irritation.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H319 Causes serious eye irritation.</p> <p>H351 Suspected of causing cancer.</p> <p>H373 May cause damage to organs (Blood) through prolonged or repeated exposure if swallowed.</p> <p>H400 Very toxic to aquatic life.</p>	<p>P273 Avoid release to the environment.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P301 + P312 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell.</p> <p>P302 + P352 + P312 IF ON SKIN: Wash with plenty of water.Call a POISON CENTER/ doctor if you feel unwell.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p>
5	hydrochloric acid low Hg	HCl	Merck	7647-01-0	 	 UN 1789	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H335 May cause respiratory irritation.</p>	<p>P234 Keep only in original packaging.</p> <p>P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.</p> <p>P264 Wash skin thoroughly after handling.</p> <p>P271 Use only outdoors or in a well-ventilated area.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse</p>





6	nitric acid low Hg	HNO ₃	Merck	7697-37-2	  	 	<p>H272 May intensify fire; oxidiser</p> <p>H290 May be corrosive to metals</p> <p>H314 Causes severe skin burns and eye damage</p> <p>H331 Toxic if inhaled</p>	<p>P220 Keep/store away from combustible materials.</p> <p>P260 Do not breathe mist/vapours/spray.</p> <p>P280 Wear protective gloves/protective clothing/eye protection/face protection.</p> <p>P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing.</p> <p>Rinse skin with water [or shower].</p> <p>P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P310 Immediately call a POISON CENTER/doctor.</p>
7	sulfuric acid low hg	H ₂ SO ₄	Merck	7664-93-9			<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>





8	Tin (II) chloride	SnCl ₂	Merck	10025-69-1	   	 UN 3260	<p>H302 + H332 Harmful if swallowed or if inhaled.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H317 May cause an allergic skin reaction.</p> <p>H373 May cause damage to organs through prolonged or repeated exposure.</p> <p>H410 Very toxic to aquatic life with long lasting effects.</p>	<p>P273 Avoid release to the environment.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
9	Std. Hg	-	inorganic	-	 	 UN 3264	<p>H303 May be harmful if swallowed</p> <p>H314 Causes severe skin burns and eye damage</p> <p>H332 Harmful if inhaled</p>	-
10	Std. Hg	-	Accu	-	 	 UN 3264	<p>H302 Harmful if swallowed.</p> <p>H315 Irritating to skin.</p> <p>H318 Causes serious eye damage.</p> <p>H371 May cause lung damage.</p>	-

ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ แอมโมเนีย-ไนโตรเจน




ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Sodium Hydroxide	NaOH	Merck	1310-73-2		 UN 1823	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>


2	di-Sodium tetraborate decahydrate	$\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$	Merck	1303-96-4	 	-	<p>H319 Causes serious eye irritation.</p> <p>H360FD May damage fertility. May damage the unborn child.</p>	<p>P201 Obtain special instructions before use.</p> <p>P202 Do not handle until all safety precautions have been read and understood.</p> <p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p>
3	Ammonium chloride	NH_4Cl	Merck	12125-02-9		-	<p>H302 Harmful if swallowed.</p> <p>H319 Causes serious eye irritation.</p>	<p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>






4	Sulfuric acid 95-97%	H ₂ SO ₄	Merck	7664-93-9		 UN 1830	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
5	Methyl red	C ₁₅ H ₁₅ N ₃ O ₂	Merck	493-52-7	-	-	-	-
6	Methylene blue	C ₁₆ H ₁₈ N ₃	Merck	-		-	H302 Harmful if swallowed.	-
7	Boric acid	H ₃ BO ₃	Merck	10043-35-3		-	<p>H360FD May damage fertility. May damage the unborn child.</p>	<p>P201 Obtain special instructions before use.</p> <p>P202 Do not handle until all safety precautions have been read and understood.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p> <p>P405 Store locked up.</p> <p>P501 Dispose of contents/ container to an approved waste disposal plant.</p>

8	Sodium carbonate	Na_2CO_3	Merck	497-19-8		-	H319 Causes serious eye irritation	<p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear eye protection/ face protection.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P337 + P313 If eye irritation persists: Get medical advice/ attention.</p>
9	Ethanol	$\text{C}_2\text{H}_5\text{OH}$	Merck	64-17-5	 	 UN 1170	H225 Highly flammable liquid and vapour. H319 Causes serious eye irritation.	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.</p> <p>No smoking.</p> <p>P240 Ground/bond container and receiving equipment.</p> <p>Response</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>Storage</p> <p>P403 + P233 Store in a well-ventilated place. Keep container tightly closed.</p>



ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ Oil&grease และ Hydrocabon

ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Sulfuric acid 95-97%	H ₂ SO ₄	Merck	1.00731.2497		 UN 1830	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage.	P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.
2	Kieselgur (สารช่วยกรอง)	-	Supelco	68855-54-9		-	H372 Causes damage to organs (Lungs) through prolonged or repeated exposure if inhaled.	P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray. P264 Wash skin thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P314 Get medical advice/ attention if you feel unwell. P501 Dispose of contents/ container to an approved waste disposal plant.






3	Standard Oil and Grease 1,000 mg/L	-	Sigme	-		-	H318 Causes serious eye damage.	P280 Wear eye protection/ face protection. P305 + P351 + P338 +P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
4	Silica gel	-	Sigme	112926-00-8	-	-	-	-










5	n-Hexane	$\text{CH}_3(\text{CH}_2)_4\text{CH}_3$	Merck	110-54-3	   	 UN 1208	<p>H225 Highly flammable liquid and vapour.</p> <p>H304 May be fatal if swallowed and enters airways.</p> <p>H315 Causes skin irritation.</p> <p>H336 May cause drowsiness or dizziness.</p> <p>H361fd Suspected of damaging fertility. Suspected of damaging the unborn child.</p> <p>H373 May cause damage to organs (Nervous system) through prolonged or repeated exposure if inhaled.</p> <p>H411 Toxic to aquatic life with long lasting effects</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P240 Ground/bond container and receiving equipment.</p> <p>P273 Avoid release to the environment.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P302 + P352 IF ON SKIN: Wash with plenty of soap and water.</p> <p>P314 Get medical advice/ attention if you feel unwell.</p> <p>Storage</p> <p>P403 + P233 Store in a well-ventilated place. Keep container tightly closed.</p>
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ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ pH






ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Buffer Solution pH 7.00	-	HACH	-	-	-	-	-
2	Buffer Solution pH 10.01	-	HACH	-	-	-	-	-
3	Buffer Solution pH 4.01	-	HACH	-	-	-	-	-
4	Buffer Solution pH 2.00	-	Merck	-	-	-	-	-
5	Buffer Solution pH 10.00	-	Merck	-	-	-	-	-
6	pH calibration standard 7.41	-	HACH	-	-	-	-	-
7	Solution saturated with AgCl	-	HACH	-	 	-	H319 Causes serious eye irritation. H411 Toxic to aquatic life with long lasting effects.	Handle environmental release according to local, state, federal, provincial requirements. Wear protective gloves / protective clothing / eye protection / face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. . Collect spillage.
8	storage solution	-	HACH	-	-	-	-	-










ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบซัลไฟด์

ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Starch soluble GR	-	Merck	9005-84-9	-	-	-	-
2	Iodine	I ₂	VWR	7553-56-2	  	  UN 3495	<p>H290 May be corrosive to metals.</p> <p>H302 Harmful if swallowed.</p> <p>H312 Harmful in contact with skin.</p> <p>H315 Causes skin irritation.</p> <p>H318 Causes serious eye damage.</p> <p>H332 Harmful if inhaled.</p> <p>H335 May cause respiratory irritation.</p> <p>H336 May cause drowsiness or dizziness.</p> <p>H372 Causes damage to organs through prolonged or repeated exposure</p>	<p>Wash face, hands and any exposed skin thoroughly after handling</p> <p>Do not eat, drink or smoke when using this product</p> <p>Wear protective gloves/protective clothing/eye protection/face protection</p> <p>Use only outdoors or in a well-ventilated area</p> <p>Do not breathe dust/fume/gas/mist/vapors/spray</p> <p>Keep only in original container</p> <p>Get medical attention/advice if you feel unwell</p> <p>Inhalation</p> <p>IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing</p> <p>Call a POISON CENTER or doctor/physician if you feel unwell</p> <p>IF ON SKIN: Wash with plenty of soap and water</p> <p>Call a POISON CENTER or doctor/physician if you feel unwell</p> <p>If skin irritation occurs: Get medical advice/attention</p> <p>Take off contaminated clothing and wash before reuse</p> <p>IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and</p>

3	Salicylic acid	-	VWR	69-72-7	  	-	H302 Harmful if swallowed. H318 Causes serious eye damage. H361d Suspected of damaging the unborn child.	Prevention Obtain special instructions before use Do not handle until all safety precautions have been read and understood Use personal protective equipment as required Wash face, hands and any exposed skin thoroughly after handling Do not eat, drink or smoke when using this product
4	Sodium hydroxide	NaOH	Merck	1310-13-2	  	-	H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage	P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. Response P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.
5	potassium iodide	KI	Merck	7681-11-0	  	-	H372 Causes damage to organs (Thyroid) through prolonged or repeated exposure if swallowed.	P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray. P264 Wash skin thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P314 Get medical advice/ attention if you feel unwell. P501 Dispose of contents/ container to an approved waste disposal plant.

6	zinz acetate dihydrate	$\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 2\text{H}_2\text{O}$	Merck	5970-45-6	  	 UN 3077	H302 Harmful if swallowed. H318 Causes serious eye damage. H411 Toxic to aquatic life with long lasting effects.	P264 Wash skin thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P273 Avoid release to the environment. P280 Wear eye protection/ face protection. P301 + P312 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. P305 + P351 + P338 IF IN EYES: Rinse cautiously
7	Sodium thiosulphate pentrahydrate	$\text{Na}_2\text{O}_3\text{S}_2 \cdot \text{H}_2\text{O}$	VWR	10102-17-7		-	H500 May form combustible dust concentrations in air.	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention. Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur. Inhalation Remove to fresh air. If breathing is difficult, give oxygen. Get medical attention immediately if symptoms occur. Ingestion Do NOT induce vomiting. Get medical attention.



8	Hydrochloric acid 37%	HCl	Merck	-	 	 UN 1789	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H335 May cause respiratory irritation.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.</p>
9	Sulfuric acid	H ₂ SO ₄	Merck	7664-93-9		 UN 2796	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.</p>






10	potassium hydrogen bi-iodate	$\text{KH}(\text{IO}_3)_2$	Merck	13455-24-8	 	  UN 3085	<p>H272 May intensify fire; oxidizer.</p> <p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P220 Keep away from clothing and other combustible materials.</p> <p>P260 Do not breathe dusts or mists.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p>
11	sodium sulphide nonahydrate	$\text{Na}_2\text{S} \cdot \text{H}_2\text{O}$		1313-84-4	   	 UN 1849	<p>H302 Harmful if swallowed.</p> <p>H311 Toxic in contact with skin.</p> <p>H314 Causes severe skin burns and eye damage.</p> <p>H410 Very toxic to aquatic life with long lasting effects.</p>	-





ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ TDS



ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Sodium chloride	NaCl	Merck	7647-14-5	-	-	-	-





ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ TKN

ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Sodium Hydroxide	NaOH	Merck	1310-73-2		 UN 1823	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage.</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
2	Sodium thiosulfate pentahydrate	Na ₂ O ₃ S ₂ *5H ₂ O	Merck	10102-17-7	-	-	-	


3	Potassium sulfate	K_2SO_4	Merck	7778-80-5		-	H319 Causes serious eye irritation.	<p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear eye protection/ face protection.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes.</p> <p>Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P337 + P313 If eye irritation persists: Get medical advice/ attention.</p>
4	Copper (II) sulphate per	$CuSO_4 \cdot 5H_2O$	BDH	7758-99-8	  	 UN 3077	H302 Harmful if swallowed. H318 Causes serious eye damage. H410 Very toxic to aquatic life with long lasting effects	<p>P280 Wear protective gloves/protective clothing/eye protection/face protection.</p> <p>P273 Avoid release to the environment.</p> <p>P301+P330+P331</p> <p>IF SWALLOWED: rinse mouth. Do NOT induce vomiting.</p> <p>P305+P351+P338</p> <p>IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308+P310</p> <p>IF exposed or concerned: Immediately call a POISON CENTER/doctor.</p>

5	Sulfuric acid 95-97%	H_2SO_4	Merck	7664-93-9		 UN 1830	<p>H290 May be corrosive to metals.</p> <p>H314 Causes severe skin burns and eye damage</p>	<p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.</p>
6	Nicotinic acid	$\text{C}_6\text{H}_5\text{NO}_2$	Merck	59-67-6		-	<p>H319 Causes serious eye irritation.</p>	-
7	Methyl red	$\text{C}_{15}\text{H}_{15}\text{N}_3\text{O}_2$	Merck	493-52-7	-	-	-	-
8	Methylene blue	$\text{C}_{16}\text{H}_{18}\text{N}_3$	Merck	-		-	H302 Harmful if swallowed.	-



9	Boric acid	H_3BO_3	Merck	10043-35-3		-	H360FD May damage fertility. May damage the unborn child.	<p>P201 Obtain special instructions before use.</p> <p>P202 Do not handle until all safety precautions have been read and understood.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p> <p>P405 Store locked up.</p> <p>P501 Dispose of contents/ container to an approved waste disposal plant.</p>
10	Sodium carbonate	Na_2CO_3	Merck	497-19-8		-	H319 Causes serious eye irritation.	<p>P264 Wash skin thoroughly after handling.</p> <p>P280 Wear eye protection/ face protection.</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes.</p> <p>Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P337 + P313 If eye irritation persists: Get medical advice/ attention.</p>




11	Phenolphthalein	$C_{20}H_{14}O_4$	Merck	77-09-8		-	<p>H341 Suspected of causing genetic defects.</p> <p>H350 May cause cancer.</p> <p>H361f Suspected of damaging fertility.</p>	<p>P201 Obtain special instructions before use.</p> <p>P202 Do not handle until all safety precautions have been read and understood.</p> <p>P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p> <p>P405 Store locked up.</p> <p>P501 Dispose of contents/ container to an approved waste disposal plant.</p>
12	Ethanol	C_2H_5OH	Merck	64-17-5	 	 UN 1170	<p>H225 Highly flammable liquid and vapour.</p> <p>H319 Causes serious eye irritation.</p>	<p>P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</p> <p>P240 Ground/bond container and receiving equipment.</p> <p>Response</p> <p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>Storage</p> <p>P403 + P233 Store in a well-ventilated place. Keep container tightly closed.</p>

ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบ TSS

ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Cellulose Microcrystalline	-	Merck	9004-34-6	-	-	-	-
2	cilite545	-	Supelco	6885-54-9		-	H372 Causes damage to organs through prolonged or repeated exposure if inhaled.	P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray. P264 Wash skin thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P314 Get medical advice/ attention if you feel unwell. P501 Dispose of contents/ container to an approved waste disposal plant.

ข้อมูล MSDS สารเคมีสำหรับงานวิเคราะห์ทดสอบความกระด้าง (Water Hardness)

ที่	ชื่อสารเคมี	สูตร	ยี่ห้อ	CAS-No.	สัญลักษณ์		ประเภทอันตราย	การแก้ไขเบื้องต้น/การเก็บรักษา
					GHS	Un model regulation		
1	Eriochrome black t	-	Merck	1787-61-7	-	-	-	-
2	Calcium carbonate	CaCO ₃	Merck	471-34-1	-	-	-	-
3	EDTA disodium salt	-	Merck	6381-92-6	 	-	H332 Harmful if inhaled. H373 May cause damage to organs (Respiratory Tract) through prolonged or repeated exposure if inhaled. H412 Harmful to aquatic life with long lasting effects.	P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray. P271 Use only outdoors or in a well-ventilated area. P273 Avoid release to the environment. P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell. P314 Get medical advice/ attention if you feel unwell. P501 Dispose of contents/ container to an approved waste disposal plant.

4	2-Aminoethanol	C ₂ H ₇ NO	ALDRICH	141-43-5	 	 UN 2491	H302 + H312 + H332 Harmful if swallowed, in contact with skin or if inhaled. H314 Causes severe skin burns and eye damage. H335 May cause respiratory irritation. H412 Harmful to aquatic life with long lasting effects.	P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth. P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
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