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GDMLAC

TEST REPORT

Test No.: SC211948

Sample: Water based extinguishing agent

Applicant: BANGWEI (SHANXI) FIRE TECHNOLOGY DEVELOPMENT CO., LTD

Testing Organization: Department of Comparative Medicine of Guangdong Medical Experimental Animal Center (GDMLAC)

Registered Address: Room B87, 2nd Floor, Lihe Business Center, No. 26, 27, 28, 29, Yuenan Street, Huangsha Avenue, Liwan District, Guangzhou

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Declaration

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Test Report

Sample No.: TC214462 Test No.: SC211948

Sample: Water based extinguishing agent	Category: Commissioned Test
Manufacturer: BAMGWEI (SHANXI) FIRE TECHNOLOGY DEVELOPMENT CO.,LTD	Specification: —
Applicant: BAMGWEI (SHANXI) FIRE TECHNOLOGY DEVELOPMENT CO.,LTD	Purity: —
Lot No.: 20210002	Package: Bottled
Received Date: Nov. 25th, 2021	Property: Solid
MFD: Aug.6th,2021	Storage Condition: RT
EXP: —	Received Quantity: 500 mL
Test Item: Acute Inhalation Toxicity , Acute Eye Irritation/Corrosion, Acute Dermal Toxicity, Acute Dermal Irritation/Corrosion	Examined Quantity: 500 mL

Test Period: Nov. 26th, 2021 ~ Dec. 17th, 2021

Test Standard: GB/T 21605-2008 Test method of acute inhalation toxicity for chemicals
GB/T 21609-2008 Chemicals-Test method of acute eye irritation/corrosion
GB/T 21606-2008 Test method of acute dermal toxicity for chemicals
GB/T 21604-2008 Chemicals-Test method of acute dermal irritation/corrosion

Test Method: GB/T 21605-2008 Test method of acute inhalation toxicity for chemicals
GB/T 21609-2008 Chemicals-Test method of acute eye irritation/corrosion
GB/T 21606-2008 Test method of acute dermal toxicity for chemicals
GB/T 21604-2008 Chemicals-Test method of acute dermal irritation/corrosion

1 Test Results

1.1 Acute Inhalation Toxicity: The animals showed no abnormal symptoms during the exposure period and the observation period of 14 days. Their body weight increased normally, no animal died, LC_{50}>2251 mg/m^3. At the end of the test, gross anatomy of all animals was performed, no abnormality was observed by naked eyes.

1.2 Acute Eye Irritation/Corrosion: Conjunctival edema and congestion were observed in all rabbits' test eyes at 1 h and 24 h after exposure, and no irritation reaction was found in test eyes and control eyes at other time points. The highest

weighted average of total integral 4 days after exposure was 4.00, and the duration was 24 hours.

1.3 Acute Dermal Toxicity: No abnormal reactions were found on test animals during exposure and 14 d observation period. Body weight of test animals increased, and all animals survived. Acute dermal toxicity LD_{50} of test sample on New Zealand rabbits was higher than 2000 mg/kg body weight.

1.4 Acute Dermal Irritation/Corrosion: No erythema or oedema was observed on control site or test site of rabbits. Average acute skin irritation scores of test sample were 0 , and response category of acute skin irritation was nonirritant.

2 Test Conclusions

According to GB/T 21605-2008 Test method of acute inhalation toxicity for chemicals, GB/T 21609-2008 Chemicals-Test method of acute eye irritation/corrosion, GB/T 21606-2008 Test method of acute dermal toxicity for chemicals, GB/T 21604-2008 Chemicals-Test method of acute dermal irritation/corrosion, the acute inhalation toxicity to NIH mice was classified as low toxic, the response category of acute eye irritation is slightly irritating, and Grade 3 , and the acute dermal toxicity to New Zealand rabbits was classified as low toxici, and non-irritant onto rabbits' skin.

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Editor: ZhangYulian **Auditor:** Liang Zhijun **Approver:** Kuang Shaosong **Date:** Jan. 10th, 2022

Signatures and stamp of testing organization

Action: We only responsible for the test results of the submitted sample.

Sample No.: TC214462 Test No.: SC211948

I. Acute Inhalation Toxicity

1 Test System

SPF NIH mice (20, half male and half female), supplied by Guangdong Medical Laboratory Animal Center. The laboratory animal production license: SCXK (Guangdong Province) 2018-0002. The laboratory animal quality certificate No.: 44007200097974. The animals weighted between 18.0~20.2 g before test. The laboratory animal using license: SYXK (Guangdong Province) 2018-0002. Room temperature: 20 ~ 26 ℃, relative humidity: 40 % ~ 70 %, 12 h/12 h light and dark cycles. The laboratory animal test certificate No.: 00288805. Drinking water and feed were supplied by GDMLAC. The animal feed production license: Feed License of Guangdong Province (2019) 05073.

2 Test Methods

2.1 Dose design: The dynamic method was used for inhalation for 4 h, and the dose was greater than 2000 mg/m^3.

2.2 Grouping:All 20 animals were included in the test group, half male and half female.

2.3 Preparation method: Direct use without preparation.

2.4 Density of test samples: Six samples (each 1.0 mL) were accurately taken and weighed, and the calculated density was 1.1568 g/mL (1156.8 mg/mL).

2.5 Toxicity method: The mice were poisoned by dynamic method, and the mice needed to be weighed before being poisoned. Mice were placed in the toxicological chamber of HOP-MED 8050F/54 systemic inhalation control device, and the chamber door was closed. The sample solution was placed in a special sample bottle and connected to the atomization system. After the mice were inhaled in dynamic mode for 4 h, the residual liquid was collected and the toxicological concentration was calculated. In the absence of an appropriate test method. the following formula can be used to calculate the poison concentration,

$C = \frac{a \times d}{V_1 + V_2} \times 10^6$, C- poison concentration (mg/m³); a-Quantity of atomized test product (mL); d-Relative density of test product; V_1-Input air volume of the poisoning cabinet (L); V_2- Toxic cabinet volume (L).

At least one observation should be made for each animal within 30 min after poisoning, and regular observation should be made within the first 24 h. The time of appearance and disappearance of signs of toxic effect and the time of death should be observed and recorded. After that, they were observed once a day for 14 days. The animals that died of poisoning during the observation period and were euthanized at the end of the experiment should undergo gross anatomy and gross observation. If abnormal tissues or organs are found, further histomathological examination should be made. Animals were weighed on the 0th, 7th and 14th day.

2.6 Result determination: If the mice died during the experiment, the dose should be reduced or multiple doses should be designed to carry out the experiment again. If no mice died, the test product was considered to have induced acute inhalation of LC_{50} in mice greater than the concentration of the poison. The toxicity of the tested products was evaluated according to GB/T 21605-2008 Test method of acute inhalation toxicity for chemicals .

Table 1 Assessment of acute inhalation toxicity

LC_{50} (mg/m³)	Toxicity grading
< 20	Poisonous
20 ~	High toxic
200 ~	Moderate toxic
> 2000	Low toxic

Note: Cite (Yin Songnian et al.) "Industrial Chemicals Acute Identification Specifications and Experimental Methods".

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3 Test Results

After 4 hours of poisoning, the atomized test product volume was 9.4 mL, and the input air volume of the exposure cabinet was 4.81 m^3, the volume of the poisoning cabinet is 0.02 m^3.

Calculate 4 h inhalation concentration:

$$C = \frac{1156.8mg/mL \times 9.4mL}{(4.81+0.02)\ m^3} \approx 2251mg/m^3$$

No abnormal symptoms were observed during the exposure period and the 14-day observation period, with normal weight growth and no animal death (Table 2), LC_{50}>2251 mg/m^3.At the end of the experiment, gross anatomy of all animals was performed, and no abnormality was observed by naked eyes.

4 Test Conclusions

According to GB/T 21605-2008 Test method of acute inhalation toxicity for chemicals, LC_{50}>2251 mg/m^3, the toxicity of sample was classified as low toxic.

5 Attached sheet

Table 2 Acute inhalation toxicity test results ($\bar{x} \pm s$)

Group	Dose (mg/m^3)	Sex	*n*	Weight (g)			Mortality rate (%)
				d0	d7	d14	
Test group	2251	♂	10	18.8±0.9	28.4±1.2	34.1±1.9	0
		♀	10	18.4±0.4	23.2±0.9	26.9±1.5	0

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II. Test method of acute eye irritation/corrosion

1 Experimental system

4 conventional New Zealand rabbits, female, supplied by Guangdong Medical Laboratory Animal Center (Sanshui Base), the laboratory animal production license certification was SCXK (Guangdong Province) 2019-0035, animal certificate No. 44411600009346. Body weight of animals was 2.1 ~ 2.2 kg before test, and 2.3 ~ 2.4 kg after test. Animals were housed in the laboratory animal room of Guangdong Medical Laboratory Animal center. The laboratory animal using certification was SYXK (Guangdong Province) 2018-0002, Room temperature:18 ~ 26 ℃, relative humidity:40 % ~ 70 %, 12 h/12 h light and dark cycles, animal experiment No.: 00290993. Drinking water and feed were supplied by GDMLAC. The animal feed production license: Feed License of Guangdong Province (2019) 05073.

2 Test Methods

2.1 Dose design: Test eye was exposed with 0.1 mL test sample. Control eye was set as blank control without exposure.

2.2 Grouping: Self-contrasted method was used in this test and the left eye was set as blank control. The right eye was set as test while.

2.3 Preparation of test sample: Test sample was used directly.

2.4 Test procedure: 24 h before commencement of the test, both eyes of each rabbit were examined visually and using 2% sodium fluorescein solution and slit lamp microscope, and no abnormality was found. 0.1 mL test sample liquid was instilled into the conjunctival sac of test eye of each rabbit. After dropping the test object, naturally loosen the animal's double eyelids and let them open or close naturally, without washing. Both eyes of each animal were examined approximately 1 h, 24 h, 48 h, 72 h, d4 and d7 after instillation and irritation scores were obtained in accordance with "GB/T 21609-2008 Chemicals-Test

method of acute eye irritation/corrosion, Appendix A, Table A.1".the corneal, iris and conjunctival damage of each animal were scored respectively, and their weighted scores were calculated. In addition, any observed injuries and other toxic and side effects are recorded and reported in detail. After exposure for 24 hours, it was stained with 2% fluorescein sodium (1 drop/eye) and examined by slit lamp microscope. No fluorescein retention was found in cornea, and no eye irritation reaction was observed in d 7 after exposure, so the experiment was terminated early.

2.5 Evaluation method: For each experimental animal, add the weighted integral of cornea, iris and conjunctiva damage according to the specified observation time point, and get the weighted total integral of each animal's eye damage, the highest theoretical integral is 110 points, and then further calculate the weighted total integral value of eye damage of the total number of experimental animals at each observation time point. According to the mean value of the highest weighted total score 4 days before exposure, the duration of irritation reaction and its score, the presence or absence of eye irritation or corrosion of the test subject was judged according to "GB/T21609-2008 Chemicals-Test method of acute eye irritation/corrosion. Appendix A, Table A.2". Eye Irritation Grading and Evaluation Standard.

3 Test results

Conjunctival edema and congestion were observed in all rabbit's test eyes at 1 h and 24 h after exposure, and no irritation reaction was found in test eyes and control eyes at other time points. The highest weighted average of total integral 4 days after exposure was 4.00, and the duration was 24 hours (Table 3).

4 Conclusions

The response category of acute eye irritation is slightly irritating, and Grade 3

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according to GB/T 21609-2008 Chemicals-Test method of acute eyeirritation/corrosion.

5 Attached sheets

Table 3 Results of acute eye irritation of test sample on New Zealand rabbits (♀, *n=4)*

(No flushing)

Time Point	Animal Number	Test eye							Control eye						
		O	A	I	R	S	D	Weighted product Partial mean	O	A	I	R	S	D	Weighted product Partial mean
1 h	1	0	0	0	1	1	0	4.00	0	0	0	0	0	0	0
	2	0	0	0	1	1	0		0	0	0	0	0	0	
	3	0	0	0	1	1	0		0	0	0	0	0	0	
	4	0	0	0	1	1	0		0	0	0	0	0	0	
24 h	1	0	0	0	1	1	0	4.00	0	0	0	0	0	0	0
	2	0	0	0	1	1	0		0	0	0	0	0	0	
	3	0	0	0	1	1	0		0	0	0	0	0	0	
	4	0	0	0	1	1	0		0	0	0	0	0	0	
48 h	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0		0	0	0	0	0	0	
	3	0	0	0	0	0	0		0	0	0	0	0	0	
	4	0	0	0	0	0	0		0	0	0	0	0	0	
72 h	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0		0	0	0	0	0	0	
	3	0	0	0	0	0	0		0	0	0	0	0	0	
	4	0	0	0	0	0	0		0	0	0	0	0	0	
4 d	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0		0	0	0	0	0	0	
	3	0	0	0	0	0	0		0	0	0	0	0	0	
	4	0	0	0	0	0	0		0	0	0	0	0	0	
7 d	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0		0	0	0	0	0	0	
	3	0	0	0	0	0	0		0	0	0	0	0	0	
	4	0	0	0	0	0	0		0	0	0	0	0	0	

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Note：O：Corneal opacity；A：Damaged corneal area；I：Iris injury；R：Conjugate membrane hyperemia；S：Conjunctional membrane edema；D：Binding membrane secretion。Weighted integral=O×A×5+I×5+（R+S+D）×2。

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III. Test method of acute dermal toxicity for chemicals

1 Experimental system

10 conventional New Zealand rabbits, half female and half male, supplied by Guangdong Medical Laboratory Animal Center (Sanshui Base), the laboratory animal production license certification was SCXK (Guangdong Province) 2019-0035,animal certificate No.44411600009304, animals weighted between 2.0 ~ 3.0 kg before test. Animals were housed in the laboratory animal room of Guangdong Medical Laboratory Animal center. The laboratory animal using certification was SYXK (Guangdong Province) 2018-0002, Room temperature: 18 ~ 26 ℃, relative humidity: 40 % ~ 70 %, 12 h/12 h light and dark cycles, animal experiment No.: 00288189.Drinking water and feed were supplied by GDMLAC. The animal feed production license: Feed License of Guangdong Province (2019) 05073.

2 Test Methods

2.1 Dose design: Method of a limit test at 2000 mg/kg body weight was used in this test.

2.2 Grouping: No grouping was needed in this test, and all animals was used in this test.

2.3 Preparation of test sample: Test sample was used directly.

2.4 Test procedure: Fur of back of rabbits were clipped gently about 24 h before exposure (about 13 cm × 16 cm, no less than 10 % of total skin of each rabbit). This skin was set as test region without damage. Test sample was exposed onto rabbits' skin with a dose of 2000 mg/kg body weight, and then covered with double-deck gauze and glass paper. And then fully fixed with non-irritating medical adhesive tape. Put Elizabeth collar on New Zealand rabbits after poisoning to prevent animals from licking the test samples. After 24 hours of exposure, remove the fixture and cover, and wash off the remaining test

products on the skin with water.

Within 30 minutes after exposure, observe each animal at least once, and regularly observe and record the occurrence, disappearance and death time of toxic action signs within the first 24 hours. Then observe once a day for 14 days. Bodyweight of each rabbit was recorded on the day before exposure, d7 and d14 after exposure. Animals that died of poisoning during the observation period and were killed at the expiration of the observation period should be subjected to gross anatomy and naked eye observation. If abnormal tissues or organs are found, further histopathological examination should be made.

2.5 Evaluation: If any animal dies during the test, it is necessary to reduce the dose or design multiple doses to conduct the test again; Acute dermal toxicity LD_{50} of test sample was greater than 2000 mg/kg bodyweight if no animal dies during test, no toxic signs was observed or no severe loss of bodyweight. Acute dermal toxicity grade was made in accordance with "GB/T21606-2008 Test method of acute dermal toxicity for chemicals, Appendix C, Table C.6", acute dermal toxicity grading standard.

3 Test results

No abnormal reactions were found on test animals during exposure and 14 d observation period. Bodyweight of test animals increased, and all animals survived (Table 4). Acute dermal toxicity LD_{50} of test sample on New Zealand rabbits was higher than 2000 mg/kg bodyweight.

4 Conclusions

Acute dermal toxicity LD_{50} of test sample on New Zealand rabbits was higher than 2000 mg/kg bodyweight. And the test sample is low toxic according to GB/T21606-2008 Test method of acute dermal toxicity for chemicals.

5 Attached Tables

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Table 4 Results of acute dermal toxicity of test sample ($\bar{x} \pm s$)

Group	Dose (mg/kg bodyweight)	Sex	*n*	Weight (g)			Mortality rate (%)
				before exposure	d7	d14	
Test group	2000	♂	5	2548.8±168.4	2666.4±61.4	2984.3±132.0	0
		♀	5	2327.7±107.2	2664.9±115.3	2754.3±105.0	0

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IV. Test method of acute dermal irritation/corrosion

1 Experimental system

4 conventional New Zealand rabbits, female, supplied by Guangdong Medical Laboratory Animal Center (Sanshui Base), the laboratory animal production license certification was SCXK (Guangdong Province) 2019-0035, animal certificate No. 44411600009355. Body weight of animals was 2.0 ~ 2.2 kg before test, and 2.1 ~ 2.3 kg after test. Animals were housed in the laboratory animal room of Guangdong Medical Laboratory Animal center. The laboratory animal using certification was SYXK (Guangdong Province) 2018-0002, Room temperature:18 ~ 26 ℃, relative humidity:40 % ~ 70 %, 12 h/12 h light and dark cycles, animal experiment No.: 00289175. Drinking water and feed were supplied by GDMLAC. The animal feed production license: Feed License of Guangdong Province (2019) 05073.

2 Test Methods

2.1 Dose design: Skin of test section was exposed with 0.5 g test sample. Skin of control section was blank control without exposure.

2.2 Grouping: All rabbits were used in this test. Self-contrasted method was used in this test and the left section was set as test section while the right side was set as blank control section.

2.3 Preparation of test sample: Test sample was used directly.

2.4 Test procedure: Fur of test and control section (3 cm × 3 cm) on back of each rabbit was gently clipped 24 h before exposure. 0.5 g test sample solution was added to 2.5 cm × 2.5 cm medical gauze and moistened with sodium chloride injection, and then applied onto test skin, wrap the application site with the medical adhesive plaster for 4 h. Control section was set as blank control without exposure. Test sample was removed 4 h after exposure, and skin of test and control section was cleaned. Each section was observed at 24 h, 48 h and 72 h

after exposure, and irritation scores were obtained in accordance with "GB/T 21604-2008 Chemicals-Test method of acute dermal irritation/corrosion Table 1".

2.5 Evaluation methods: All erythema scores and oedema scores of each time point were totaled separately for each animal. Average skin irritation score of all animals at each time point was calculated. Category of acute skin irritation was evaluated in accordance with "GB/T 21604-2008 Chemicals-Test method of acute dermal irritation/corrosion Table 2" using the greatest average skin irritation score.

3 Test results

No erythema or oedema was observed on control site or test site of rabbits. Average acute skin irritation scores of test sample were 0 (Table 5), and response category of acute skin irritation was nonirritant.

4 Conclusions

The test sample is non-irritant onto rabbits' skin according to GB/T 21604-2008 Chemicals-Test method of acute dermal irritation/corrosion.

5 Attached sheets

Table 5 Results of acute skin irritation test of test sample (♀)

Animal No.	24 h						48 h						72 h					
	Test site			Control site			Test site			Control site			Test site			Control site		
	E	O	T	E	O	T	E	O	T	E	O	T	E	O	T	E	O	T
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average		0			0			0			0			0			0	

Note: E: erythema, O: oedema, T: total.