

Germanium is a semi-metallic chemical element that has the atomic number 32, and symbol “Ge”, widely used as a semiconductor.

It is said that germanium may contribute to better health by increasing oxygen in the body, activating body metabolism, and preventing a stiff neck or lower back pain. It is, therefore used as a material in accessories such as bracelets or necklaces, and as an ingredient in supplements such as health drinks or tablets.

ITOFINISH GERMANIUM is a functional finishing agent mainly composed of such germanium that also acts as a source for the emission of far-infrared rays.

PROPERTIES

- **Appearance** : White / Grey dispersion
- **Main Ingredient** : GeO² (inorganic germanium)
- **Ionic Character** : Weakly anionic
- **pH** : 6.5 – 8.5
- **Solubility** : Easily soluble in water

APPLICATION

In Padding:

- **ITOFINISH GERMANIUM** : 5 – 8%
- **ITOBINDER AG** : 3%
- **ITOXLINKER LJ10** : 0.5%
- **Drying** : 110°C for 2 min.
- **Curing** : 150°C for 1-2 min.

In Exhaustion

- **ITOFIX EZF*** : 3 %
- **ITOFINISH GERMANIUM (Fresh bath)*** : 5-8%
- **ITOBINDER AG (Fresh bath)*** : 3-8 %
- **Liquor Ratio** : 10:1, at 40°C for 15 min.
- **Dehydrating and Drying** : 100°C
- **Curing** : 150°C for 1 min.

*each bath should be run at 40°C for 15 minutes.

CHARACTERISTICS

1. Germanium is a chemical element with symbol Ge, No. 32, a lustrous, grey-white, brittle metalloid with a diamond like crystalline structure, which has been mainly used in transistors and diodes.
2. Germanium has 32 electrons including 4 negatively charged electrons moving along the outermost orbital. When it is applied on the skin and warmed to temperatures of 32°C or more, such 4 negatively charged electrons break out, and penetrate into the subcutaneous tissue by osmotic pressure. These negatively charged electrons reach capillaries within subcutaneous tissue and promote ionic equilibrium in blood. It is considered that blood may be stabilized by them when it is under an acidic or alkali condition. Through the activation of biologic energy and blood circulation, it may ease such physical discomfort as muscular stiffness, pain, fatigue, etc.
3. Negative ions produced by germanium emit far infrared rays helping to retain heat

DISCLAIMER

The information herein offered is based on the best of our knowledge at present. However, we are not able to guarantee these matters, as the result of application may vary according to conditions adopted. Preliminary tests are, therefore, recommended in all cases. Please refer to MSDS regarding handling of the products.

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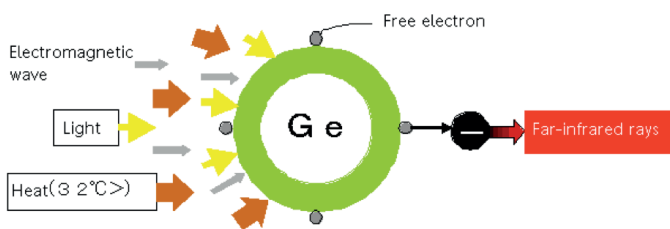


APPENDIX

Example of Exhaust Application

- Set bath at 30°C with goods circulating
- Add 3% of Pre diluted Itofix EZF
- Raise to 50°C and run for 25 minutes
- Drain bath, fill and give a 2 minute rinse with cold water, then drain again
- Fill bath and raise to 50°C then add well dispersed 5-8% of ITOFINISH GERMANIUM and run for 25 minutes
- Add well dispersed 8% of ITOBINDER and run for a further 25 minutes
- Drain bath and unload
- Hydro extract goods
- Dry (temperature must not exceed 150°C)

Properties of Germanium



Germanium emits free electrons when it is heated to a temperature of 32°C or more or if exposed to light. The emitted free electrons then generate far-infrared radiation.

The cohesion of germanium with clothes is effective in improving the heat-retention property of clothes because of far-infrared rays derived from germanium. It is also claimed that such clothes may have an effect in purifying blood.

Germanium containing in ITOFINISH GERMANIUM is free from the emission of dangerous radiation, although some germaniums emit such radiation.

The effect of far Infrared radiation

Clothes treated by ITOFINISH GERMANIUM emit far-infrared rays derived from germanium, of which temperature may go up to around 36°C or within the range of body temperature.

Treatment conditions

- **Specimen** : 100 % cotton knitted cloth
- **Recipe** : 5 % soln. ITOFINISH GERMANIUM
- **Application** : Padding -> Drying at 110oC x 2 min. -> Curing at 150°C x 1 min.

Test method

Specimens in size of 4 cm x 4 cm are doubled over as if making a pocket, in which a thermo sensor is inserted, and closed by adhesive tape.

Specimens are left for 20 minutes at 25°C, and transferred into a constant-temperature oven at 40°C. Then temperature of specimens is determined.

Result of determination (°C)

Time	Blank	Specimens	Temp. difference
30 sec.			
Later			
1 min. later	26.8	26.7	-0.1
2 min. later	31.8	31.9	+0.1
3 min. later	33.0	33.2	+0.2
4 min. later	34.3	34.4	+0.1
5 min. later	35.8	36.8	+1.0
6 min. later	36.7	37.9	+1.2
7 min. later	37.5	38.6	+1.1
8 min. later	38.2	39.3	+1.1
9 min. later	38.8	40.0	+1.2
10 min. later	39.3	40.6	+1.3
later	39.9	41.2	+1.3

[Comment] In comparison between specimens and blank, temperature increased by 1.0 – 1.3°C in case that temperature of clothes is around 36°C or more.

APPENDIX

Blood Circulation

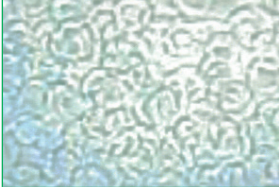
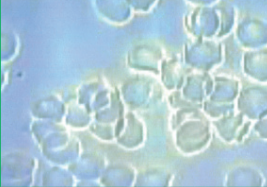
Healthy human body likes to derive weak alkali and negative ion from food and nature. Modern people, however, likely have bad living habits or stress such as drinking, smoking, exposing to UV radiation, breathing in the polluted air, etc. Their bodies are often contaminated by free radical.

Wearing clothing treated by ITOFINISH GERMANIUM may purify your blood because negative electrons derived from germanium can be supplements for sludgy blood.

Treatment conditions

- **Specimen** : 100 % cotton knitted cloth
- **Recipe** : 5 % soln. ITOFINISH GERMANIUM
- **Application** : Padding -> Drying at 110°C x 2 min. -> Curing at 150°C x 1 min.

The treated fabric was wrapped around the left upper arm. After 30 minutes had passed, a drop of blood was taken from the middle finger of left hand. And the image magnified by an electron microscope was taken as follows:

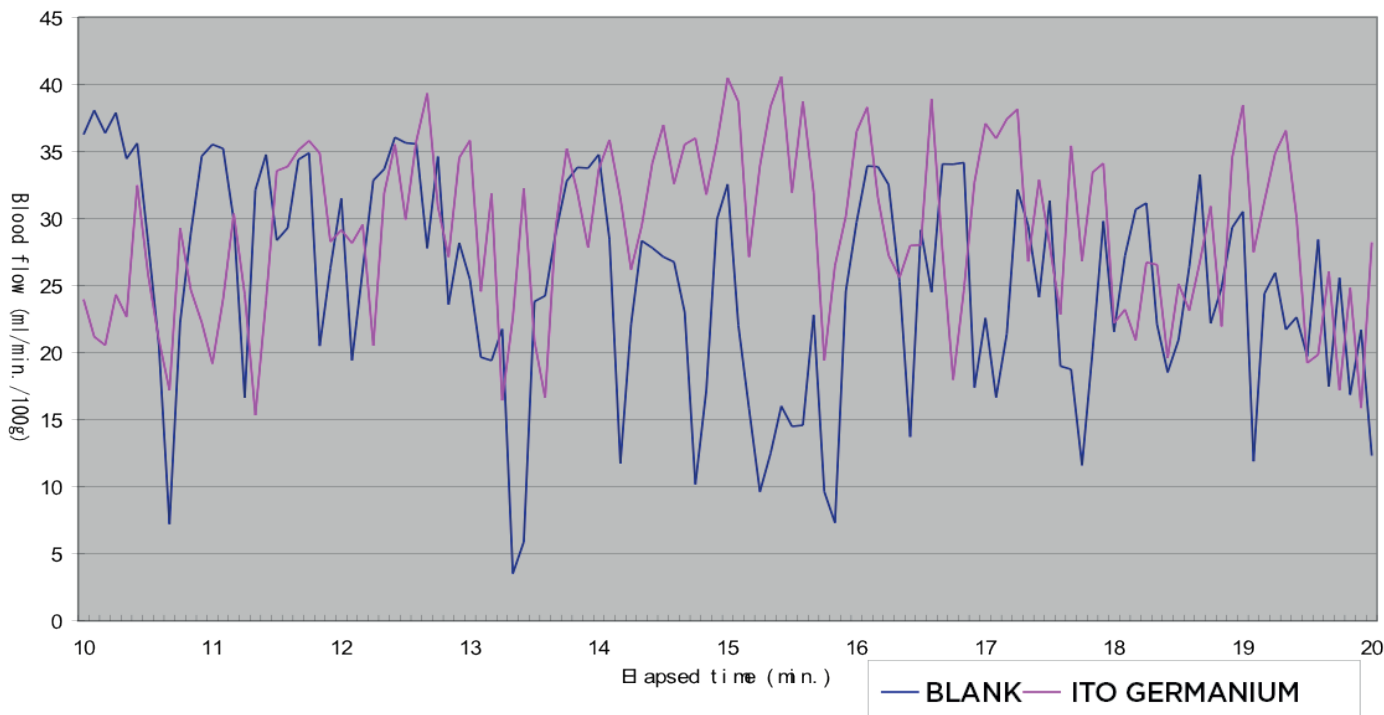
[Before]		[After]
	30 min. later	
Red blood cells were coagulated		Red blood cells were separated

TEST DATA

Blood flow when wearing cloth treated by ITOFINISH GERMANIUM

Blank at average: 25.431 ml/min./100g

ITOFINISH GERMANIUM at average: 29.294 ml/min./100g



Determination of blood flow with cloth treated by ITOFINISH GERMANIUM

Specimen : Cotton Knitted cloth treated by:

- **3% soln. :** ITOFINISH GERMANIUM
- **2% soln. :** ITOBINDER AG
- **0.5% soln. :** ITOXLINKER LJ10

Padding -> Drying at 110°C x 2 min -> Curing at 150°C x 2 min.

How to determine blood flow : Specimens (blank and cloth treated by ITOFINISH GERMANIUM) were wound on the abdomen of subject, left 10 minutes, and blood flow for 10 minutes was determined.

Place of determination : Industrial Technology Centre of Wakayama Prefecture

Instrument for determination : Laser-Med ALF21RD

Subject: Male age 34 (determination on the tip middle finger)

Result of determination : Blank at average ITOFINISH GERMANIUM at average

25.431 ml/min/100g 29.294 ml/min/100g

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TEST DATA

Elapsed time (sec)	Elapsed time (min)	Blood flow with blank (ml/min/100g)	Blood flow with ITOFINISH GERMANIUM (ml/min/100g)
600	10	36.25	23.95
605		38.049	21.18
610		36.37	20.539
615		37.87	24.31
620		34.45	22.67
625		35.59	32.459
630		28.21	25.79
635		20.599	20.979
640		7.209	17.189
645		22.259	29.25
650		28.909	24.659
655		34.64	22.239
660	11	35.5	19.169
665		35.2	23.979
670		29.829	30.349
675		16.63	24.34
680		32.119	15.329
685		34.75	23.88
690		28.36	33.54
695		29.279	33.86
700		34.369	35.079
705		34.869	35.779
710		20.5	34.86
715		26.29	28.26
720	12	31.479	29.139
725		19.42	28.159
730		26.149	29.52
735		32.83	20.52
740		33.67	31.9
745		36.03	35.51
750		35.63	29.92
755		35.549	35.75
760		27.779	39.31
765		34.59	30.879

Elapsed time (sec)	Elapsed time (min)	Blood flow with blank (ml/min/100g)	Blood flow with ITOFINISH GERMANIUM (ml/min/100g)
905		22.02	38.67
910		15.81	27.129
915		9.639	33.92
920		12.5	38.349
925		16.009	40.56
930		14.49	31.919
935		14.589	38.709
940		22.789	31.939
945		9.639	19.42
950		7.309	26.469
955		24.569	30.159
960	16	29.72	36.47
965		33.889	38.29
970		33.85	31.54
975		32.509	27.229
980		25.27	25.59
985		13.73	27.969
990		29.139	28.01
995		24.51	38.89
1000		34.05	27.58
1005		34.039	17.98
1010		34.159	24.629
1015		17.39	32.69
1020	17	22.56	37.069
1025		16.649	35.949
1030		21.38	37.389
1035		32.14	38.13
1040		29.46	26.789
1045		24.12	32.859
1050		31.319	27.977
1055		18.99	22.84
1060		18.75	35.409
1065		11.599	26.81
1070		20.2	33.439

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TEST DATA

770		23.579	27.129
775		28.169	34.51
780	13	25.45	35.79
785		19.659	24.549
790		19.399	31.84
795		21.739	16.429
800		3.529	22.62
805		5.889	32.259
810		23.81	20.86
815		24.229	16.63
820		28.959	29.4
825		32.789	35.19
830		33.79	31.919
835		33.75	27.81
840	14	34.75	33.68
845		28.449	35.849
850		11.739	31.52
855		22.1	26.189
860		28.33	29.439
865		27.789	34.139
870		27.129	36.95
875		26.75	32.579
880		23	35.51
885		10.179	35.97
890		17.17	31.779
895		29.93	35.65
900	15	32.54	40.459

1075		29.79	34.099
1080	18	21.56	22.199
1085		27.21	23.2
1090		30.659	20.92
1095		31.139	26.709
1100		22.1	26.55
1105		18.52	19.58
1110		20.96	25.11
1115		26.37	23.14
1120		33.27	26.789
1125		22.18	30.9
1130		24.829	21.96
1135		29.32	34.549
1140	19	30.5	38.43
1145		11.899	27.49
1150		24.409	31.3
1155		25.949	34.85
1160		21.719	36.529
1165		22.63	30.059
1170		19.72	19.219
1175		28.42	19.84
1180		17.469	26.049
1185		25.57	17.209
1190		16.87	24.809
1195		21.68	15.869
1200	20	12.32	28.21
		3051.67	3515.23
Average after 10-20 min.		25.431	29.294

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