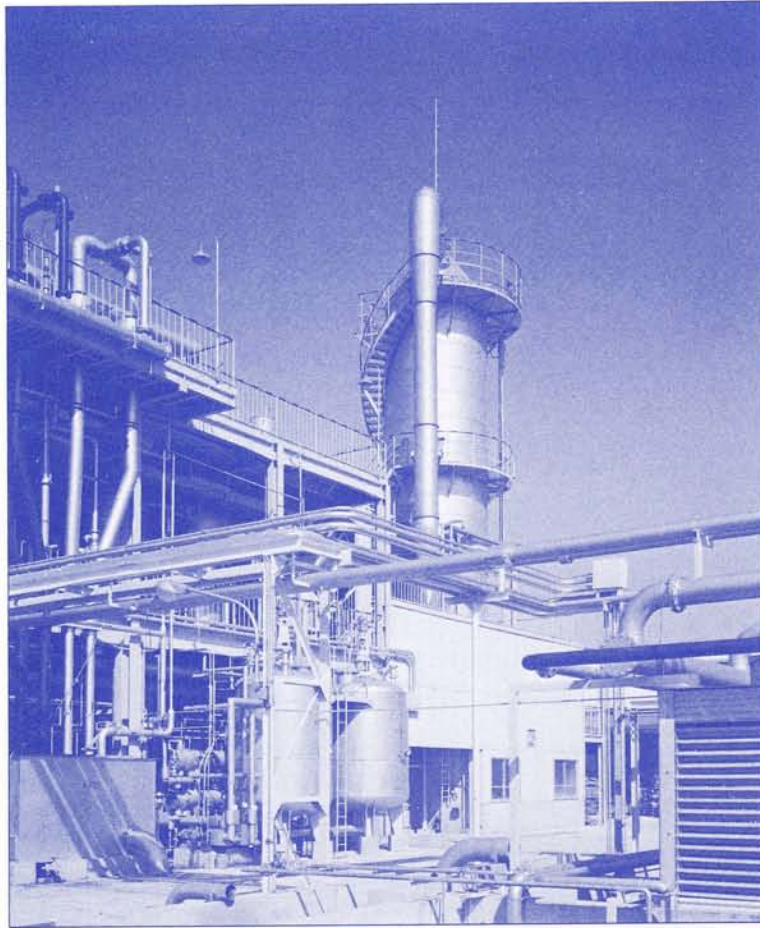


N ニュートロン
NEUTRON



NIPPON FINE CHEMICAL CO., LTD.



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Introduction

Nippon Fine Chemical Co., Ltd. was the first to develop the slipping agent of fatty acid amide type in JAPAN and has been marketing it under the trade name of NEUTRON since 1958.

The NEUTRONS are series of excellent slipping agents which function as slipping agent, anti-blocking agent and mold release agent, imparting special effects and features polyolefin films, sheetings and coatings. It also has dispersing effect for pigments and dyestuffs.

The NEUTRON has been enjoying a high reputation for its quality and performance among the domestic customers, and now we see the NEUTRON shipped to an increasing number of customers abroad.

We hope this brochure will help you to be familiarized with the NEUTRON so it may have an opportunity to serve your needs.

日本精化は脂肪酸アミドをニュートロンの商品名で昭和33年に上市しました。

ニュートロンはポリオレフィンフィルムの滑剤、ブロッキング防止剤としてすばらしい性能をもち、又顔料染料の分散剤としても有効です。

ニュートロンは高品質、高性能を誇り、国内の多くの需要家に好評を得ているとともに、年々海外の需要家も増えています。

このカタログがみなさまに御利用いただければ幸いです。

Summary

1) FATTY ACID AMIDES

The slipping agent is an additive used in the thermoforming of thremoplastic resins in order to give the film an easier opening and to facilitate the processing and mold release of the resins by improving the flow of the resins.

Because of their excellent slipping effects and compatibilities with resins, fatty acid amides are used as slipping agents.

滑剤とはフィルムの口開きをよくし又、熱可塑性樹脂の加熱成型を行うときに、その流動性をよくして、加工を容易にするため、および成型品を金型から抜き取ることを容易にするために添加する薬剤です。脂肪酸アミドは樹脂に対する抜群の滑性効果と相溶性のため、滑剤として使用されています。

2) MELTING POINTS OF FATTY ACID AMIDES

The melting points of fatty acid amides are remarkably higher than those of the corresponding fatty acids, and remain rather stable at about 100°C without being affected by the increasing numbers of carbons of 6 and over.

As regards unsaturated fatty acid amides, the melting points are 50~60°C higher than those of the corresponding unsaturated fatty acids.

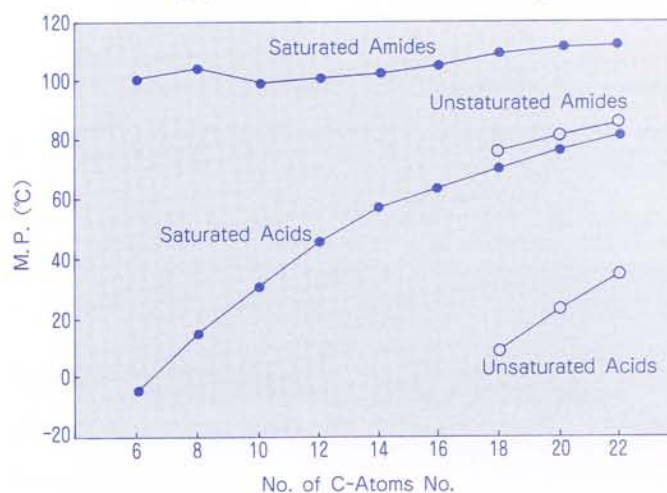
飽和脂肪酸アミドの融点は、脂肪酸に比べて著しく高くなり、しかも炭素数6以上になると炭素数が増しても融点は 100°C前後であまり変わらない。

不飽和脂肪酸アミドの場合も対応する脂肪酸より50~60°C融点が高い。

Melting points of saturated and unsaturated amides.

AMIDE	No. of C atoms	mp(°C)
Caproic	6	101
Caprylic	8	105
Capric	10	99
Lauric	12	100
Myristic	14	103
Palmitic	16	106
Stearic	18	109
Behenic	22	112
Oleic	18 ⁻¹	76
Erucic	22 ⁻¹	83

Melting points of amides and fatty acids.



3) SOLUBILITY OF FATTY ACID AMIDES

In general, the solubility of fatty acid amides in organic solvents is considerably lower compared with the corresponding fatty acids.

In addition, fatty acid amides are considered to have good compatibilities with fat, wax, mineral oil, paraffin, resin etc.

脂肪酸アミドは一般に有機溶剤に対する溶解度は、相当する脂肪酸に比べるとかなり低い。

又、油脂、ろう、鉱物油、パラフィン、樹脂等に対してはかなり相溶性があり、これも脂肪酸アミドの特徴です。

Solubility of fatty acid amides 30°C, g/100g solvent

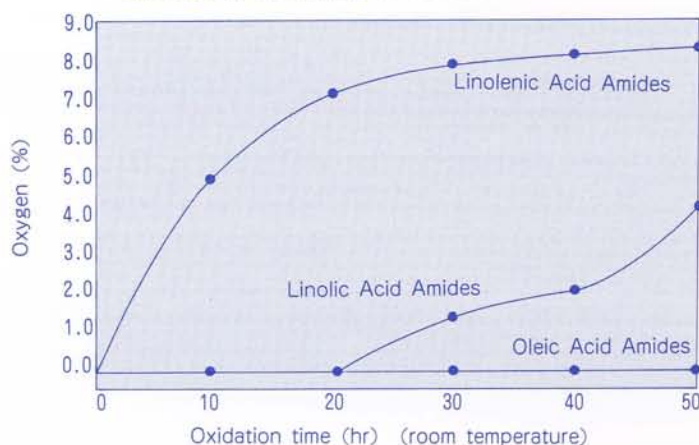
	NEU TRON	NEU TRON-S	NEU TRON-2	BNT	PNT	SNT
Methanol	79.1	3.1	0.6	< 0.1	< 0.1	< 0.1
Ethanol	74.9	6.7	1.0	< 0.1	0.2	< 0.1
IPA	64.0	8.7	1.4	< 0.1	0.4	< 0.1
MEK	31.8	1.9	0.3	< 0.1	0.1	< 0.1
Ethyl acetate	14.6	0.6	0.1	< 0.1	0.1	< 0.1
Butyl acetate	13.4	0.7	0.2	< 0.1	0.3	< 0.1
n-Hexane	0.1	0.5	< 0.1	< 0.1	< 0.1	< 0.1
Benzene	9.8	0.4	0.1	< 0.1	1.9	< 0.1
Toluene	7.0	0.3	0.1	< 0.1	1.7	< 0.1
Xylene	5.1	0.2	0.1	< 0.1	1.3	< 0.1
Carbon tetrachloride	11.9	< 0.1	< 0.1	< 0.1	0.7	< 0.1

4) STABILITY OF FATTY ACID AMIDES

As regards fatty acid amides with unsaturated bonds, the compatibilities with resins increase, but of those with two or more unsaturated bonds, the oxidation stability decreases.

脂肪酸アミドは不飽和結合があると樹脂との相溶性は向上しますが、不飽和結合が2コ以上になると酸化安定性は低下します。

Oxidation stability of unsaturated amides



The heat stability of fatty acid amides does not change upto about 150°C, but gradually decomposes at above 200°C and forms nitrile.



This water reacts with the amides and partial hydrolysis occurs.



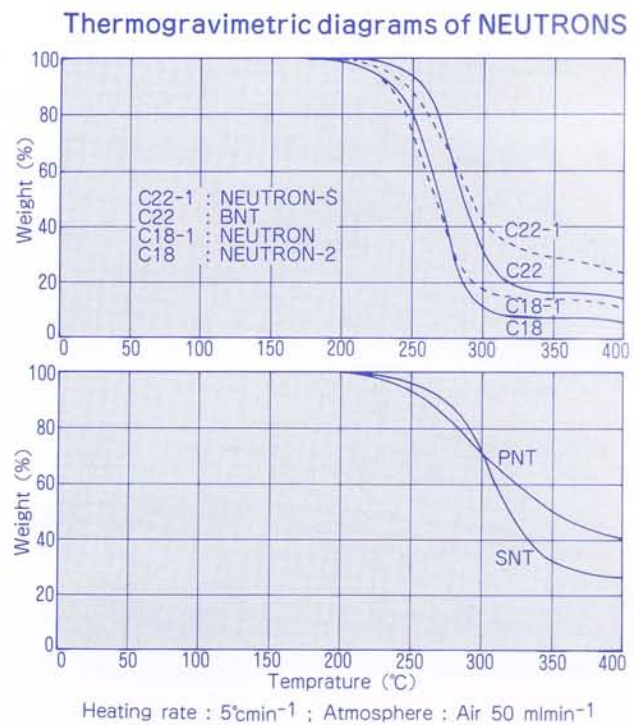
An examination of the heat stability of fatty acid amides by using the thermobalance shows that in the case of fatty acid amides, the greater the carbon number is, the better the heat stability is.

The thermogravimetric diagrams of unsaturated and saturated fatty acid amides are as follows:

脂肪酸アミドは 150℃程度では変化しないが、一般に 200℃を超えると徐々に分解し、ニトリルを生成します。

この際生成する水がアミドと反応し、一部加水分解をおこす。

熱天秤により、熱安定性を調べると単体脂肪酸の場合、炭素数が多い程安定性は良好です。飽和脂肪酸アミド及び不飽和脂肪酸アミドの加熱減量曲線は次の通りです。



Generally fatty acid amides with longer chain of molecules have better slipping effects and heat stabilities, but have poorer compatibilities often resulting in blooming and or blushing, which spoils the appearance of the finished products.

一般に分子鎖長の長い脂肪酸アミドは、滑性効果、熱安定性ともにすぐれているが、樹脂との相溶性は低下するので、製品外観を損ねるブルーミングや白化の原因となることがある。

NEUTRON

1) FEATURES OF NEUTRON

The NEUTRON is developed as slipping or antiblocking agents for polyolefin resins and are guaranteed to have the highest quality.

The resins added with 0.03~0.3% of NEUTRON shows excellent slipping effects and keep the transparency of the finished products perfectly.

The resins added with NEUTRON:

- (1) has excellent in hue and perfectly transparent when melted.
- (2) has the heat and oxidation stabilities.
- (3) has no ashes and no contaminations.

ニュートロンはポリオレフィン樹脂の滑剤、アンチブロッキング剤として開発したもので、最高の品質を誇っています。

通常樹脂に対し0.03~0.3% の添加によりすばらしい効果をあらわし、しかも製品の透明性を損ねることはありません。

2) SPECIFICATIONS OF NEUTRON

	NEUTRON	NEUTRON-2
Chemical name	Oleamide	Stearamide
Formula	$C_{17}H_{33}CONH_2$	$C_{17}H_{35}CONH_2$
Appearance	White granule	White granule
Color (Gardner)	1 max	1 max
Melting Point (°C)	72 - 77	99 - 105
Acid Value	1 max	1 max
Iodine Value	80 - 90	5 max
Amide Purity (%)	97 min	97 min
Moisture (%)	0.1 max	0.1 max
Foreign matter	none	none
Typical composition (%)	C_{18}^{-1} : 70 others : 30	C_{18} : 65 others : 35
List No.	2-824 2-976	2-824
Cas. No.	301-02-0	124-26-5

	NEUTRON-S	BNT
Chemical name	Erucamide	Behenamide
Formula	$C_{21}H_{41}CONH_2$	$C_{21}H_{43}CONH_2$
Appearance	White beads	White beads
Color (Gardner)	1 max	1 max
Melting Point (°C)	79 - 84	105 - 115
Acid Value	1 max	1 max
Iodine Value	70 - 78	5 max
Amide Purity (%)	97 min	97 min
Moisture (%)	0.1 max	0.1 max
Foreign matter	none	none
Typical composition (%)	C_{22}^{-1} : 85 others: 15	C_{22} : 85 others: 15
List No.	2-824 2-981	2-824
Cas. No.	112-84-5	3061-75-4

	SNT	PNT
Chemical name	N-Stearylerucamide	N-Oleylpalmitamide
Formula	$C_{21}H_{43}CONHC_{18}H_{37}$	$C_{15}H_{31}CONHC_{18}H_{35}$
Appearance	Pale yellow powder	Pale yellow powder
Color (Gardner)	6 max	5 max
Melting Point (°C)	70 - 80	70 - 80
Acid Value	1 max	1 max
Iodine Value	30 - 50	30 - 50
Amide Purity (%)	97 min	97 min
Moisture (%)	0.1 max	0.1 max
Foreign matter	none	none
List No.	2-3513	2-3514
Cas. No.	10094-45-8	16260-09-6

List No (既存化学物質ナンバー)

The list number means Japan's existing chemical substances No.

3) FDA: REGULATORY STATUS OF NEUTRON

NEUTRON meets the requirements of the following Food and Drug Administration food additive regulation.

*NEUTRON-2

Reference Section 21 CFR	Application
175.105	Adhesives.
177.1210	Sealing gaskets for food container closures.
178.3860	Release agents in petroleum waxes.
178.3910	Surface lubricants used in the manufacture of prepackaged foods.
179.45	Packaging materials during the irradiation of prepackaged foods.
181.28	Release agents.

*NEUTRON

Reference Section 21 CFR	Application
175.105	Adhesives.
175.300	Resinous and polymeric coatings.
177.1350	Ethylene-vinyl acetate copolymers.
178.3910	Surface lubricants used in the manufacture of metallic articles.
179.45	Packaging materials during the irradiation of prepackaged foods.
181.28	Release agents.

*NEUTRON-S

Reference Section 21 CFR	Application
175.105	In adhesives.
176.180	In paper and paperboard brought in contact with dry food.
177.1200	In cellophane.
177.1210	In sealing gaskets for food container closures. (The concentration of erucamide in these materials is not to exceed five percent(5%) by weight.)
177.1350	In ethylene-vinyl acetate copolymers.
177.1400	In water-insoluble hydroxyethyl cellulose film.

- 178.3860 For use as a release agent in petroleum waxes meeting the FDA requirements of Section 176.3710 and in polymeric resins.
- 179.45(c)(2)(d) In packaging film materials for use in the radiation preservation of prepackaged foods. The concentration of erucamide is not the polymers listed (i. e., polyethylene terephthalate, Nylon 6, polyethylene, vinyl chloride-vinyl acetate copolymer, and acrylonitrile copolymers).

***BNT & PNT**

Reference Section 21 CFR	Application
177.1200	In cellophane.
178.3860	For use as a release agent in petroleum waxes meeting the FDA requirements of Section 176.3710 and in polymeric resins.

***SNT**

Reference Section 21 CFR	Application
178.3860	For use as a release agent in petroleum waxes meeting the FDA requirements of Section 176.3710 and in polymeric resins.

4) PL[®]: REGULATORY STATUS OF NEUTRON

We prove that NEUTRON conforms to the positive list of "Japan Hygienic Olefin and Styrene Plastics Association".
ポリオレフィン等合成樹脂製食品容器包装等に関するポジティブリスト。

	confirmation No.	registration No.
NEUTRON	113	(B) AL-0113
	115	(B) NL-0115
NEUTRON-S	114	(B) NL-0114
	115	(B) NL-0115
NEUTRON-2	112	(B) NL-0112
	115	(B) NL-0115
BNT	829	(B) GL-0829
SNT	114	(B) NJ-1044
PNT	828	(B) NJ-0828

5) USE OF NEUTRON

NEUTRON can be used in various industrial fields, since they, as stated above, have good compatibilities with fat, wax, paraffin, resin, rubber, mineral oil etc. and are comparatively stable against heat as they are waxlike material with high melting points.

(A) Slipping agent and mold release agent

Polyolefin films are used in quantities as material for bags, and the material's blocking property make the bags, mouth hard to open, slowing down the packing operation. Polyolefin films added with a small amount of NEUTRON neither have blocking tendency nor affect the transparency and the printability of films.

Furthermore, being non-toxic, polyolefin films can be used as food packaging material.

Add NEUTRON to polyolefin resins and blend them sufficiently in blenders or other suitable containers to be mixed uniformly, before the molding work should be started. On the other hand, the resins added with NEUTRON in the process of making polyolefin resins can also be used as a master-batch. Besides, NEUTRON can be used in order to improve the flow of thermoplastic and thermosetting resins and to facilitate release the mold.

..... How to use NEUTRON for polyolefin resins.

(1) In preparation of polyolefin master-batch,

First; Add antioxidants to the resins and blend them thoroughly by a Bumbery-Mixer.

Second; Add NEUTRON to the resin at the temperature approximating the melting point of the resin.

Third; Take the resin out at the stock at 105~110°C and pelletize it.

The percentage amount of NEUTRON added must be adjusted on the enduse of the polyolefin resin.

(2) Slipping agent for polyolefin film and tubing

a) Before extrusion, as usual with any slipping agent,

add NEUTRON to the resin at the ratio of 0.03~0.3% and blend them homogeneously.

- b) Master-Batch already with NEUTRON can also be used. Dilute the Master-Batch with neutral resins to obtain the desired slip. If no proper blender is available, use wooden, plastic or stainless steel vessels and wooden or plastic bars. Do not use metal vessels. Notwithstanding the small quantity of NEUTRON added, blend the mixture very slowly even when the blender used. For example 20kgs. of the resin must be blended for as long as 15 minutes.

(B) Compounding agent for rubber

Used as a compounding agent for rubber, NEUTRON not only serve as a dispersion agent but also helps to increase the vulcanizing effect, to improve the tensile strength or other physical properties and to increase the glaze of the finished products. They have a remarkable effect to prevent cracks caused by sunlight.

They also have the same effect on the synthetic rubber. They are known to have easy rolling process, good flow and mold release in vulcanization process. Besides, NEUTRON used in high carbon improve the rubber in tensile strength and anti-wearing.

(C) Compound wax

NEUTRON compounded in crayon at the rate of 5~30 % act as an excellent dispersion agent for pigments, helping to improve the melting point, prevent the softening or bleeding in summer time, make pour-molding possible, and make the color of crayon clear, so that the crayons well on papers and are easy to apply on glass.

NEUTRON can be used for colored pencils and water colors. Compounded with wax of low melting point such as soft paraffin, its dropping point can be remarkably improved, so they can be used for candles, insulating wax, water-proof papers and various compound wax.

In addition, they can also be used for mold wax for precision casting.

(D) Coating agent

Synthetic resin coating agents added with a small amount of NEUTRON neither stick to each other nor cause cakeing.

Paraffin papers treated with the paraffin added with NEUTRON have more slippery surface and have no tack and no adhesion.

(E) Printing inks

NEUTRON can be used for printing inks for various purposes. For instance they can work as a preventer of stick of inks in over-printing, an anti-tack agent, an anti-blocking, a controller of viscosity of inks and a dispersion agent for pigments etc...

(F) Other uses

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