



# AMBERLITE™ IRP88

Pharmaceutical Grade Cation Exchange Resin

## (POLACRILIN POTASSIUM NF)

### PRODUCT DATA SHEET

AMBERLITE™ IRP88<sup>[1]</sup> resin is a weakly acidic potassium form cation exchange resin supplied as a dry powder. It is widely used as a tablet disintegrant in oral dosage formulations of drug products. AMBERLITE IRP88 resin is the potassium salt of a crosslinked polymer derived from methacrylic acid. Its swelling properties upon hydration provide its utility as a tablet disintegrant. AMBERLITE IRP88 resin has been proposed for use in taste masking applications, specifically for B-lactam antibiotics.

Letters of authorization granting access to the file by FDA in support of NDA and ANDA submittals will be provided upon request. Similar help can also be offered in support of the registration of formulations containing AMBERLITE IRP88 in many other countries worldwide. AMBERLITE IRP88 resin is manufactured in accordance with Good Manufacturing Practices (cGMP) for bulk pharmaceutical chemicals.

### IDENTIFICATION

AMBERLITE IRP88 can be identified by infrared spectroscopy, as shown in the example in Figure 1.

### TYPICAL PHYSICAL PROPERTIES

AMBERLITE IRP88 resin complies with the compendial specifications for Polacrillin Potassium NF when tested in conformance to the compendial test methods presented in current USP/NF.

These compendial properties are shown below A Drug Master File for this product is maintained with the United States Food and Drug Administration.

Amberlite IRP88 IR Spectrum

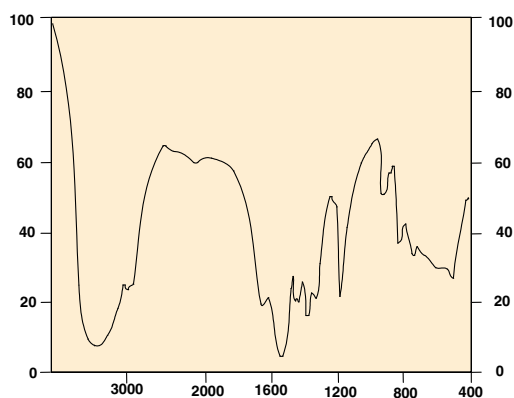


Figure 1

### TABLE I : TYPICAL PHYSICAL PROPERTIES

Identity (by IR Spectrum) _____	Identical to USP reference standard
Loss on Drying <sup>[2]</sup> <sup>[3]</sup> _____	10.0 % maximum
Powder Fineness	
0.075 - 0.150 mm <sup>[2]</sup> <sup>[3]</sup> _____	30.0 % maximum
> 0.150 mm <sup>[2]</sup> <sup>[3]</sup> _____	1.0 % maximum
Iron <sup>[2]</sup> <sup>[3]</sup> _____	100 ppm maximum
Sodium <sup>[2]</sup> <sup>[3]</sup> _____	0.20 % maximum
Heavy Metals <sup>[2]</sup> <sup>[3]</sup> _____	0.002 % maximum
Potassium <sup>[2]</sup> <sup>[3]</sup> _____	20.6 % to 25.1 %
Residual Methacrylic acid <sup>[3]</sup> _____	200 ppm max.
Organic Volatile Impurities <467> <sup>[3]</sup> _____	Meets requirements

<sup>[1]</sup> The use of AMBERLITE pharmaceutical grade ion exchange resins as components of drug formulations is subject to the Food, Drug and Cosmetic Act as amended

<sup>[2]</sup> Appears in current USP/NF.

<sup>[3]</sup> Contractual value

## CHEMICAL PROPERTIES

AMBERLITE™ IRP88 resin is a crosslinked polymer of methacrylic acid and divinylbenzene, supplied as the potassium salt (CAS 39394-76-5). The structure is shown in Figure 2.

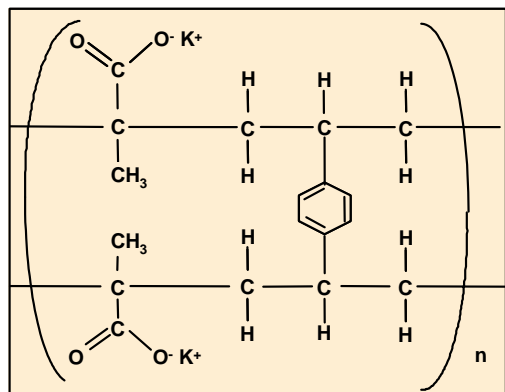


Figure 2

## APPLICATIONS

Amberlite IRP88 Resin as a Tablet Disintegrant.

Many drugs are supplied as tablets for oral administration. In some cases the effectiveness of the drug depends on the rate at which the tablet disintegrates in the gastrointestinal tract. AMBERLITE IRP88 resin is an effective table disintegrant due to its extremely large swelling capacity in aqueous solutions. Water can exert force between particles within tablet pores, but this force is relatively low. In the presence of AMBERLITE IRP88 resin these forces are enhanced, resulting in rapid tablet disintegration. AMBERLITE IRP88 resin can be used effectively at 1-2 % (weight) of a solid dosage formulation.

### Water Adsorption

AMBERLITE IRP88 resin adsorbs water rapidly due to its hydrophilic nature. Upon hydration, the resin particles swell. When incorporated into a tablet, the swelling of AMBERLITE IRP88 resin exhibits sufficient force to rupture and disintegrate even those tablets which have been subjected to very high compression force in the tableting process.

Disintegration times for tablets based upon a matrix of calcium-phosphate-carbonate-complex at various concentrations of some disintegrants are presented in Table 3. These data are presented graphically in Fig. 3. The superior rate at which AMBERLITE IRP88 resin adsorbs water when exposed to high humidity air, as compared to other disintegrants, is presented in Fig. 4.

### Adhesion

The bonding of particles in compressed tablets must be overcome in order for a tablet to disintegrate, thereby releasing the drug for bioavailability. Some disintegrants are adhesive in nature, and are thus ineffective in overcoming particle bonding. This deficiency is particularly associated with cellulosic materials. Sodium carboxymethyl cellulose and calcium sodium alginate are not effective in overcoming this bonding due to their adhesive nature. AMBERLITE IRP88 resin is nonadhesive and is frequently much more effective as a disintegrant in such formulations.

### Tablet Hardness

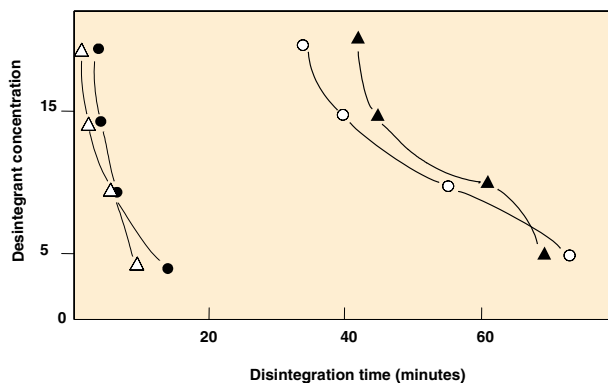
Hardness is an important factor which prevents the tablets from dusting or breaking up during packaging and shipping. Increasing the compressive force to reduce dusting can frequently retard the rate of subsequent disintegration. Table 2 presents data which shows that increasing the compressive force in the formation of tablets containing 2% by weight AMBERLITE IRP88 resin enhances the disintegration rate of the tablet.

**Table 2 : Effects of increasing pressure on disintegration time of dicalcium phosphate dihydrate tablet with 2 % AMBERLITE IRP88**

Tablet Pressure Increase from 1 to 4	Tablet Hardness (Erweka)	Disintegration Time (minutes)
P1	1.5	120
P2	7.0	15
P3	9.0	10
P4	9.5	8

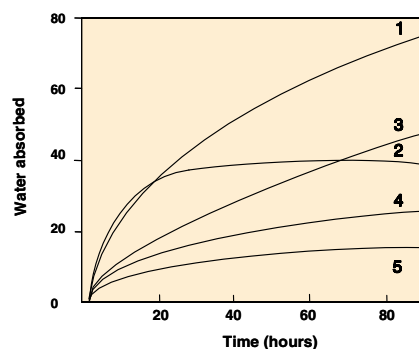
**Figure 3** shows the effect of disintegrant concentration on the disintegration times of tablets prepared from calcium-phosphate carbonate complex

- △ Amberlite™ IRP88
- Alginic acid
- Sodium carboxymethylcellulose
- ◻ Calcium sodium alginate



**Figure 4** shows the rate of water absorption of disintegrant powders at 25°C and 98% humidity.

1. Amberlite IRP88 Resin
2. Sodium carboxymethylcellulose
3. Calcium sodium alginate
4. Alginic acid
5. Cornstarch



**Table 3 : Effects of Concentration of Disintegrants on the Disintegration Time of a Calcium-Phosphate-Carbonate-Complex Tablet**

Disintegrant	Amount of Disintegrant in Tablet (%)	Tablet Hardness (Monsanto)	Disintegration Time (Minutes)
Cornstarch	5	3.0	>120
	10	3.0	>120
	15	3.0	>120
	20	3.0	>120
Calcium sodium alginate	5	4.0	67
	10	3.5	60
	15	3.5	45
	20	2.5	42
Sodium Carboxymethyl Cellulose	5	4.5	70
	10	4.5	54
	15	5.0	42
	20	3.0	37
Alginic acid	5	4.6	13
	10	3.8	5
	15	3.8	5
	20	3.5	3
AMBERLITE IRP88	5	4.0	7.5
	10	4.0	5
	15	4.0	3.3
	20	4.0	2

## SAFE HANDLING INFORMATION

### Material Safety Data Sheets

Material Safety Data Sheets (MSDS) are available for all Rohm and Haas products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. We recommend that you obtain copies of our MSDS by calling 1-800-RH-AMBER before using our products in your facilities. We also suggest that you contact your suppliers of other materials recommended for use with our products for appropriate health and safety precautions before using them.

Caution: Acidic and basic regenerant solutions are corrosive and should be handled in a manner that will prevent eye and skin contact. In addition, the hazards of other organic solvents should be recognized and steps taken to control exposure.

Nitric acid and other strong oxidizing agents can cause explosive reactions when mixed with ion exchange resins. Proper design of process equipment to prevent rapid build up of pressure is necessary if use of an oxidizing agent such as nitric acid is contemplated. Before using strong oxidizing agents in contact with ion exchange resins, consult sources knowledgeable in the handling of these materials.

Note: Ion exchange resins and polymeric adsorbents, as produced, contain by-products resulting from the manufacturing process. The user must determine the extent to which organic by-products must be removed for any particular use and establish techniques to assure that the appropriate level of purity is achieved for that use. The user must ensure compliance with all prudent safety standards and regulatory requirements governing the application. Except where specifically otherwise stated, Rohm and Haas Company does not recommend its ion exchange resins or polymeric adsorbents as supplied as being suitable or appropriately pure for any particular use. Consult your Rohm and Haas technical representative for further information.

### AMBERLITE™ IRP88

#### APPLICATIONS REFERENCE LIST

##### Tablet Disintegrant

Aboutaleb, A.E., A.M. Attia, and F.S. Habib, 1983. Effect of various disintegrants on the availability of directly compressed sulfadimidine tablets. *Pharmazie*, 38 (7): 473-475.

Arnold, J.D., 1986. Dihydrocodine/ibuprofen pharmaceutical compositions. Patent US 4,571,400.

Borodkin, S., and M.H. Yunker, 1970. Interaction of amine drugs with a polycarboxylic acid ion exchange resin. *J.Pharm. Sci.* 59 (4): 481-486.

Dawson, W., 1983. Treating hypersensitivity disease with benzoxazole derivatives. Patent US 4,416,892.

Graf, E., A.H. Ghanem, and H.M. Mahmoud, 1984. Studies on the direct compression of pharmaceuticals. 15: Effect of compression force on sulfadiazine-encompass tablets. *Pharm. Ind.* 46 (3): 279-284.

Graf, E., A.H. Ghanem, and H.M. Mahmoud, 1985. Studies on the direct compression of pharmaceuticals. 18: Effect of aging on some physical properties of tablet formulations containing certain types of disintegrants. *Pharm. Ind.* 47 (7) 773-776.

Jonas, E. et al. Water Uptake Kinetics and Swelling Force of Some Disintegrants. *Pharmazie* (1996), 51 (8), 605.

Khan, K.A., and C.T. Rhodes, 1975. Water-sorption properties of tablet disintegrants. *J. Pharm. Sci.* 64(3): 447-451

Khan, K.A., and C.T. Rhodes, 1971. Effect of compaction pressure on dissolution times of some direct compression systems. *J. Pharm, Pharmacol.*, 23 (Suppl.)

Mantovani, V., L. Stanzani, and A.P. Venturini, 1978. Erythromycin-based antibiotic preparation. Patent DE 2,745,946.

Peppas, N.A., and P. Colombo, 1989. Development of disintegration forces during water penetration in porous pharmaceutical systems. *J. Contr. Release* 10: 245-250.

Sakr, A.M., A.E. Aboutaleb, H.M. Elsabagh, and A.M. Aly, 1979. Comparative effectiveness of certain disintegrants on directly compressed sulfadimidine tablets. *Egypt. J. Pharm. Sci.* 18 (3): 219-233.

Tan, H.S., and B.M. Wegman, 1986. Tablets comprising trimethoprim and a sulfonamide. Patent EP 199,855.

Waetjen, F., M. Engelstoff, J.B. Hansen, and L.H. Jensen, 1986. Oxadiazolyimidazobenzodiazepines, their use as anticonvulsants and anxiolytics. Patent US 4,622,320.

##### Taste Masking

Anon, 1978. Taste masking beta-lactam antibiotics with macroreticular resins. *Res. Discl.* 176:12-13.

Leonard, Graham Stanley; Cooper, David; Oral liquid compositions containing paroxetine- Amberlite IRP88 complex; SmithKline Beecham PLC, UK; US 5811436, 1996

All our products are produced in ISO 9001 certified manufacturing facilities.

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