



Custom Research Diets

Harlan
TEKLAD

Dedication to the Research Community is a Key Ingredient in Every Harlan Teklad Product

Harlan Teklad has designed and developed thousands of research diets, one at a time. Harlan Teklad serves a wide spectrum of academic institutions, government agencies, laboratories, and private research facilities worldwide. Our success record is a result of uncompromising quality controls, production utilizing the finest nutritional ingredients, relentless testing, and total attention to customer service. Our diets are scientific tools for researchers in worldwide studies of up-to-date nutritional issues. We also supply quality ingredients to those who prepare their own research diets.

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Service Information

We Get a Charge out of the Challenge...

But You Don't

The more demanding your formula needs, the more we welcome the challenge. We are so certain we can provide you with the right solution, we offer the service FREE.

Quality Assurance/Manufacturing Standards

Each formula is given a unique identification number and retains that identity among the thousands of formulas in our files. All phases of diet production are controlled closely. Detailed production records and quality-control samples are maintained for every item produced.

ISO 9002

In order to provide our customers with the best possible products and services, Harlan Teklad is progressing toward ISO 9002 certification at all production facilities. We expect certification in 1996, and welcome your comments and questions.

Pricing

Prices are dependent on formulation, batch size, final product form (powder or cylindrical pellet), and special handling or analysis. Please check for current prices for each item of interest, including diet ingredients. Terms are net 30 days.

Testing

Specific chemical analyses can be tailored to individual customers' requirements. The fees from independent testing labs are added to the customer's invoice.

Irradiation

Most purified diets do not withstand autoclaving; however, we can arrange for qualified diets to be irradiated. Nominal fees and extra time are involved. Please phone for details.

Confidentiality

Each custom research diet is automatically considered confidential when it is formulated. Formal agreements of non-disclosure and confidentiality are available.

Limited Warranty

Due to the nature of our products, returns cannot be accepted. Harlan Teklad, a Harlan Sprague Dawley, Inc. company, will, at its election, replace or refund the purchase price of material which does not conform to your written specifications, subject to deviation within accepted industry standards. As a condition of this Warranty, all nonconformities must be reported to Harlan Teklad in writing upon discovery, no later than 14 days after shipment, and must be verified independently by Harlan Teklad. Harlan Teklad shall not be liable for any expenses or charges incurred without prior written approval. In no event shall Harlan Teklad be liable for any special, incidental, or consequential damages, other than stated in this paragraph. HARLAN TEKLAB HAS NO EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS, OR OTHERWISE.

Other Limitations

Although our technical staff will aid in selecting diets and ingredients, it is the buyer's responsibility to determine whether a product is suitable for the specific research use.

Products sold by Harlan Teklad are for chemical and investigational use only and are not intended for human consumption.

Introduction

Research diets generally are tools for adjusting nutrients and other dietary features. Ingredients are selected according to experimental objectives.

Harlan Teklad Research Diets

Most of our research diets are custom designed in response to requests by researchers. Discuss your needs with us. A brief listing of the types of diets we routinely provide follows.

- Vitamins, deficient/adjusted
- Minerals, deficient/adjusted
- Essential fatty acid deficient
- Amino acid deficient
- Adjusted protein
- Adjusted fat
- Adjusted carbohydrate
- Atherogenic
- Caries promoting

Examples in this brochure help illustrate the diverse types of formulas used for various reasons. Many of these examples are rodent diets. We also provide diets for many other species.

American Institute of Nutrition (AIN)

Nutritionally adequate purified type research diets for rodents have been promoted by committees from American Institute of Nutrition (AIN). Diet guidelines were established to assist researchers unfamiliar with nutritional variables. This effort began with diet AIN-76 (AIN-76A since 1980). This formula subsequently was revised and two formulas were developed (AIN-93G for growth, AIN-93M for maintenance). See J. Nutrition 123:1939-1951, 1993 for discussion. The AIN-76A and both AIN-93 formulas are among the diet examples in this brochure.

National Research Council (NRC)

The publication entitled Nutrient Requirements of Laboratory Animals (Fourth Revised Edition, 1995, Subcommittee on Laboratory Animal Nutrition, National Research Council, National Academy Press) summarizes information about minimum nutrient requirements for rat, mouse, guinea pig, hamster, gerbil, and vole. This edition also discusses considerations about feeding and diets formulation, and gives some diet examples.

These average estimated values are useful guidelines. Many nutrient requirements for laboratory animals remain to be determined.

Diet Examples

A few diet examples are presented throughout this brochure.

AIN-76A Purified Diet (Rats/Mice)

170481	g/Kg
Casein, High Protein	200.0
DL-Methionine	3.0
Sucrose	499.99
Corn Starch	150.0
Corn Oil	50.0
Fiber (cellulose)	50.0
Mineral Mix, AIN-76 (170915)	35.0
Vitamin Mix, AIN-76A (40077)	10.0
Choline Bitartrate	2.0
Ethoxyquin (antioxidant)	0.01

Reference: Second Report of Ad Hoc Committee on Standards for Nutritional Studies (1980). J. Nutrition 110, 1726. Report of the American Institute of Nutrition ad hoc Committee on Standards for Nutritional Studies (1977). J. Nutrition 107, 1340-1348.

AIN-93G Purified Diet

TD 94045	g/Kg
Casein	200.0
L-Cystine	3.0
Corn Starch	397.486
Maltodextrin ¹	132.0
Sucrose	100.0
Soybean Oil	70.0
Cellulose ² (fiber)	50.0
Mineral Mix, AIN-93G-MX (TD 94046)	35.0
Vitamin Mix, AIN-93-VX (TD 94047)	10.0
Choline Bitartrate	2.5
TBHQ ³ (antioxidant)	0.014

¹Dextrinized corn starch (hydrolysate, 90-94% tetrasaccharides and higher).

²Solka-Floc[®], 200 FCC.

³tert-butylhydroquinone.

Reference: J. Nutrition 123:1939-1951, 1993. Formulated for the growth, pregnancy, and lactational phase of rodents.

AIN-93M Purified Diet

TD 94048	g/Kg
Casein	140.0
L-Cystine	1.8
Corn Starch	465.692
Maltodextrin ¹	155.0
Sucrose	100.0
Soybean Oil	40.0
Cellulose ² (fiber)	50.0
Mineral Mix, AIN-93G-MX (TD 94046)	35.0
Vitamin Mix, AIN-93-VX (TD 94047)	10.0
Choline Bitartrate	2.5
TBHQ ³ (antioxidant)	0.008

¹Dextrinized corn starch (hydrolysate, 90-94% tetrasaccharides and higher).

²Solka-Floc[®], 200 FCC.

³tert-butylhydroquinone.

Reference: J. Nutrition 123:1939-1951, 1993. Formulated for the maintenance of adult rodents.

Mineral Deficient Diets

Unique formulas may be necessary to minimize some minerals. We have selected a few examples to illustrate this. Please talk to us for further explanations and other examples.

Copper Deficient Diet

<i>TD 80388</i>		<i>g/Kg</i>
Casein, High Protein		200.0
DL-Methionine		3.0
Corn Starch		150.0
Sucrose		504.1314
Corn Oil		50.0
Cellulose (fiber)		50.0
Calcium Phosphate, dibasic	CaHPO ₄	17.5
Sodium Chloride	NaCl	2.59
Potassium Citrate, monohydrate		7.7
Potassium Sulfate	K ₂ SO ₄	1.82
Magnesium Oxide	MgO	0.84
Manganous Carbonate		0.1225
Ferric Citrate		0.21
Zinc Carbonate		0.056
Potassium Iodate	KIO ₃	0.0004
Sodium Selenite	Na ₂ SeO ₃ ·5H ₂ O	0.0004
Chromium Potassium Sulfate	CrK(SO ₄) ₂ ·12H ₂ O	0.0193
Vitamin Mix, AIN-76A (40077)		10.0
Choline Bitartrate		2.0
Ethoxyquin (antioxidant)		0.01

Iodine Deficient Diet

<i>TD 95007</i>		<i>g/Kg</i>
Corn, yellow, ground		774.5
Wheat Gluten		194.0
L-Lysine HCl		1.5
Calcium Carbonate*	CaCO ₃	10.0
Sodium Chloride*	NaCl	10.0
Vitamin Mix, Teklad (40060)		10.0

* Reagent Grade Compound
This formula is patterned from Remington diet and has comparable low background iodine.

Iron Deficient Diet

<i>TD 80396</i>		<i>g/Kg</i>
Casein, High Protein		200.0
DL-Methionine		3.0
Sucrose		549.99
Corn Starch		150.0
Corn Oil		50.0
Mineral Mix, Fe Deficient (TD 81062)		35.0
Vitamin Mix, AIN-76A (40077)		10.0
Choline Bitartrate		2.0
Ethoxyquin (antioxidant)		0.01

Selenium Deficient Diet

<i>TD 92163</i>		<i>g/Kg</i>
Torula Yeast		300.0
DL-Methionine		3.0
Sucrose		591.0
Corn Oil		50.0
Mineral Mix, Se Deficient (TD 80313)		35.0
Calcium Carbonate	CaCO ₃	11.0
Vitamin Mix, Teklad (40060)		10.0

This kind of formula has less than 0.03 ppm background Se, which is slightly lower than for casein type diets.

Sodium Deficient Diet

<i>TD 90228</i>		<i>g/Kg</i>
Wheat, hard, ground		350.0
Corn, yellow, ground		314.49
Soybean Meal, dehulled (48%)		190.0
Corn Gluten Meal (60%)		50.0
Alfalfa Meal, dehydrated (17%)		30.0
Corn Oil		33.0
Dicalcium Phosphate, FG (18.5% P)		14.0
Calcium Carbonate, FG (38% Ca)		12.0
Mineral Mix, TD 80318		1.5
Vitamin Mix, TD 81125		3.0
DL-Methionine, FG		1.0
L-Lysine, FG		1.0
Ethoxyquin (antioxidant)		0.01

Please note: This diet typically has about 0.01-0.02% background sodium (Na), and is the basis for a popular series of adjusted sodium chloride (NaCl) diets. Ask us about them.

Zinc Deficient Diet

<i>TD 85419</i>		<i>g/Kg</i>
Egg White Solids, spray-dried		200.0
Dextrose, monohydrate		634.2658
Corn Oil		100.0
Cellulose		30.0
Vitamin Mix, Teklad (40060)		10.0
Biotin		0.004
Ethoxyquin (antioxidant)		0.02
Calcium Phosphate, dibasic*	CaHPO ₄	19.767
Magnesium Sulfate*	MgSO ₄	2.4752
Potassium Chloride*	KCl	2.2882
Sodium Chloride*	NaCl	0.7781
Ferrous Sulfate*	FeSO ₄ ·7H ₂ O	0.2
Manganese Sulfate*	MnSO ₄ ·H ₂ O	0.1662
Cupric Sulfate*	CuSO ₄	0.0151
Potassium Iodate*	KIO ₃	0.0004
Chromium Potassium Sulfate	CrK(SO ₄) ₂ ·12H ₂ O	0.02

* Reagent Grade Compound

Vitamin Deficient Diets

Unique formulas may be necessary to minimize some vitamins. We have selected a few examples to illustrate this. Please talk to us for further explanations and other examples.

Vitamin D Deficient Diet (0.47% Ca, 0.3% P)

<i>TD 89123</i>		<i>g/Kg</i>
Casein, "Vitamin-Free" Test		180.0
L-Cystine		2.0
Dextrose, monohydrate		644.18
Corn Oil		100.0
Cellulose		30.0
Mineral Mix, Ca-P Deficient (TD 79055)	13.37	
Calcium Carbonate	CaCO ₃	11.63
Potassium Phosphate, dibasic	K ₂ HPO ₄	4.9
Potassium Phosphate, monobasic	KH ₂ SO ₄	3.9
Corn Starch		4.6717
Choline Dihydrogen Citrate		3.497
Dry Vitamin E Acetate (500 U/g)		0.242
Dry Vitamin A Palmitate (500,000 U/g)		0.0396
p-Aminobenzoic Acid		0.1101
Ascorbic Acid, coated (97.5%)		1.0166
Biotin		0.0004
Vitamin B ₁₂ (0.1% in mannitol)		0.0297
Calcium Pantothenate		0.0661
Folic Acid		0.002
Inositol		0.1101
Menadione		0.0496
Niacin		0.0991
Pyridoxine HCl		0.022
Riboflavin		0.022
Thiamin HCl		0.022
Ethoxyquin (antioxidant)		0.02

Vitamin D deficient diets for rats and mice might have many different formula features depending on point of reference (especially for Ca and P). Egg white protein source is necessary for P levels less than about 0.14%. Talk with us about what is needed for your research.

Vitamin E Deficient Diet

<i>TD 88163</i>		<i>g/Kg</i>
Casein, "Vitamin-Free" Test		200.0
DL-Methionine		3.0
Dextrose, monohydrate		674.5112
Corn Oil, Tocopherol-Stripped		50.0
Cellulose (fiber)		30.0
Mineral Mix, AIN-76 (170915)		35.0
Calcium Carbonate	CaCO ₃	3.5
Choline Dihydrogen Citrate		3.5
Dry Vitamin A Palmitate (500,000 U/g)		0.04
Dry Vitamin D ₃ (500,000 U/g)		0.0044
Vitamin B ₁₂ (0.1% in mannitol)		0.05
Biotin		0.0004
Calcium Pantothenate		0.066
Folic Acid		0.002
Inositol		0.11
Menadione		0.05
Niacin		0.01
Pyridoxine HCl		0.022
Riboflavin		0.022
Thiamin HCl		0.022

This formula is a modification of TD 87196.

Vitamin C Deficient GP Diet

<i>TD 93061</i>		<i>g/Kg</i>
Alfalfa Meal, dehydrated (17%)		380.0
Oats, whole, ground		260.0
Wheat, whole, hard, ground		206.1686
Soybean Meal (48%)		120.0
Soybean Oil		12.0
Sodium Chloride	NaCl	7.0
Calcium Carbonate, FG (38% Ca)		7.5
Dicalcium Phosphate, FG (21% Ca, 18.5% P)		5.0
Mineral Mix, (TD 87390)		0.5
Dry Vitamin A Palmitate (500,000 U/g)		0.015
Dry Vitamin D ₃ (500,000 U/g)		0.004
Dry Vitamin E Acetate (500 U/g)		0.1
Vitamin B ₁₂ (0.1% trituration)		0.02
Biotin		0.0004
Calcium Pantothenate		0.03
Choline Dihydrogen Citrate		1.6
Folic Acid		0.005
Menadione		0.02
Niacin		0.015
Pyridoxine HCl		0.006
Riboflavin		0.006
Thiamin HCl		0.01

Guinea pigs do not readily consume/tolerate some purified diets designed to minimize "background" vitamin C. A diet such as TD 93061 is more palatable, and has slightly more background vitamin C.

Adjusted Protein Diets

Adjusted protein diets usually range between “protein-free” and 50% protein, depending on the research. A few examples are shown from an isocaloric series of diets.

Phosphorus also is adjusted to account for the contribution from casein.

Protein-Free Diet		
<i>TD 93228</i>		<i>g/Kg</i>
Sucrose		631.8
Corn Starch		200.0
Corn Oil		54.6
Cellulose		66.462
Vitamin Mix, Teklad (40060)		10.0
Ethoxyquin (antioxidant)		0.01
Mineral Mix, Ca-P Deficient (TD 79055)		13.37
Calcium Phosphate, dibasic	CaHPO ₄	23.72
Calcium Carbonate	CaCO ₃	0.038

6% Protein Diet		
<i>TD 90016</i>		<i>g/Kg</i>
Casein, High Protein		69.0
DL-Methionine		0.9
Sucrose		571.8
Corn Starch		200.0
Corn Oil		53.9
Cellulose		57.82
Vitamin Mix, Teklad (40060)		10.0
Ethoxyquin (antioxidant)		0.01
Mineral Mix, Ca-P Deficient (TD 79055)		13.37
Calcium Phosphate, dibasic	CaHPO ₄	21.6
Calcium Carbonate	CaCO ₃	1.6

20% Protein Diet		
<i>TD 91352</i>		<i>g/Kg</i>
Casein, High Protein		230.0
DL-Methionine		3.0
Sucrose		431.7
Corn Starch		200.0
Corn Oil		52.3
Cellulose		37.86
Vitamin Mix, Teklad (40060)		10.0
Ethoxyquin (antioxidant)		0.01
Mineral Mix, Ca-P Deficient (TD 79055)		13.37
Calcium Phosphate, dibasic	CaHPO ₄	16.66
Calcium Carbonate	CaCO ₃	5.1

40% Protein Diet		
<i>TD 90018</i>		<i>g/Kg</i>
Casein, High Protein		460.0
Sucrose		231.82
Corn Starch		200.0
Corn Oil		50.0
Cellulose		15.0
Vitamin Mix, Teklad (40060)		10.0
Ethoxyquin (antioxidant)		0.01
Mineral Mix, Ca-P Deficient (TD 79055)		13.37
Calcium Phosphate, dibasic	CaHPO ₄	9.6
Calcium Carbonate	CaCO ₃	10.2

Amino Acid Diets

Amino acid diets are the best choice for altering specific amino acids. This formula approach can be a starting point for choline/methionine deficient diet (ask about TD 90262). Here is one example of an amino acid diet (rats/mice) which has been used for a control diet, and modified for various purposes.

Amino Acid Diet		
<i>TD 86529</i>		<i>g/Kg</i>
L-Alanine		3.5
L-Arginine HCl		12.1
L-Asparagine		6.0
L-Aspartic Acid		3.5
L-Cystine		3.5
L-Glutamic Acid		40.0
Glycine		23.3
L-Histidine HCl-H ₂ O		4.5
L-Isoleucine		8.2
L-Leucine		11.1
L-Lysine HCl		18.0
L-Methionine		8.2
L-Phenylalanine		7.5
L-Proline		3.5
L-Serine		3.5
L-Threonine		8.2
L-Tryptophan		1.8
L-Tyrosine		5.0
L-Valine		8.2
Sucrose		490.88
Corn Starch		150.0
Corn Oil		100.0
Cellulose (fiber)		30.0
Mineral Mix, AIN-76 (170915)		35.0
Calcium Phosphate, dibasic	CaHPO ₄	4.5
Vitamin Mix, Teklad (40060)		10.0
Ethoxyquin (antioxidant)		0.02

Essential Fatty Acid Deficient Diets

Several different formula approaches have been used for EFA deficient diets. One example is given below. Please phone us to discuss other possibilities.

EFA Deficient Diet		
<i>TD 84224</i>		<i>g/Kg</i>
Casein, "Vitamin-Free" test		192.0
DL-Methionine		3.0
Sucrose		656.2
Hydrogenated Coconut Oil		50.0
Cellulose (fiber)		50.0
Mineral Mix, AIN-76 (170915)		35.0
Calcium Carbonate	CaCO ₃	3.8
Vitamin Mix, Teklad (40060)		10.0

Basal Mixes

Basal mixes are time savers for preparing some kinds of diets in your lab. This approach is helpful for working with various fats/oils. A couple of examples are illustrated below, and additional formulas can be designed to meet your needs.

Basal Mix (without 20% oil)		
<i>TD 88232</i>		<i>g/Kg</i>
Casein, High Protein		300.0
DL-Methionine		4.5
Sucrose		373.5
Corn Starch		187.5
Cellulose		62.5
Mineral Mix, AIN-76 (170915)		52.5
Calcium Carbonate	CaCO ₃	4.5
Vitamin Mix, Teklad (40060)		15.0

This basal mix is designed to be used at the rate of 800 g/Kg of diet, in conjunction with 200 g of the oil source(s). Levels of several nutrients are increased to account for the increased calories in 20% oil diet.

Basal Mix (for adjusted fat diet)		
<i>TD 88122</i>		<i>g/Kg</i>
Casein, "Vitamin-Free" Test		222.2222
DL-Methionine		3.3333
Sucrose		486.5556
Corn Starch		166.6667
Corn Oil		11.1111
Cellulose (fiber)		55.5556
Mineral Mix, AIN-76 (170915)		38.8889
Calcium Carbonate	CaCO ₃	4.4444
Vitamin Mix, Teklad (40060)		11.1111
Ethoxyquin (antioxidant)		0.1111

This basal mix is designed to be used at the rate of 900 g/Kg of diet, in conjunction with 100 g of the fat source (or 100 g combination of fat source and sucrose).

Diets with Cholesterol

There are various models for mice, rats, rabbits, dogs, swine, and monkeys. Fat usually is a key feature in many of these diets. Ask us about what is needed for your research.

Rabbits do not consume purified diets very well, and cholesterol often is added to a regular lab rabbit feed. Here are two examples from many of this nature.

Teklad 0533 Rabbit Diet (with 2% cholesterol added)	
<i>TD 81078</i>	<i>g/Kg</i>
Teklad 0533 Rabbit Diet, 7009, meal	980.0
Cholesterol	20.0

Teklad 0533 Rabbit Diet (0.2% cholesterol, 5% PO)	
<i>TD 92046</i>	<i>g/Kg</i>
Teklad 0533 Rabbit Diet, 7009, meal	948.0
Peanut Oil	50.0
Cholesterol	2.0

Mineral Mixtures

Several mineral mixes can be supplied from stock, and custom mixes can be designed to your specifications.

Choose a mineral mix with care. Some of them are more adequate than others. Please consult with our technical staff about specifics.

The accompanying chart invites a closer comparison among some mixtures. Chart values were calculated from mineral composition data for the compounds used in each mixture.

Remember that some minerals are contributed to diets by other diet ingredients.

Mineral Contributions to Diet (g/Kg) When Mixtures Are Used at Listed Levels															
Product Number	Mineral Mix	Diet Level	Ca	P	K	Na	Cl	S	Mg	I	Fe	Cu	Mn	Zn	F
170705	No.4179 ¹	4.0%	6.615	3.420	4.401	1.869	2.883	0.401	0.583	0.0005	0.1173	0.0061	0.0533	0.0224	
170750	Bernhart-Tomarelli	4.0%	8.997	7.456	2.675	0.763	0.743	0.501	0.603	0.0002	0.0373	0.0065	0.0464	0.0171	
170760	Rogers-Harper ²	5.0%	5.914	3.943	4.929	4.929	7.607	0.676	0.492	0.0002	0.052	0.0311	0.0197	0.0048	
170780	Hegsted IV	5.0%	6.874	3.540	7.243	3.292	5.083	0.701	0.503	0.0306	0.2294	0.0038	0.0615	0.006	
170790	Hubbell-Mendel-Wakeman	2.0%	4.348	1.001	2.394	0.628	1.903	0.091	0.190	0.0012	0.0472	0.0072	0.0023		0.009
170820	Phillips-Hart (w/cobalt) ⁴	5.0%	6.372	3.335	6.495	2.951	4.560	0.598	0.451	0.0274	0.2057	0.0034	0.0039	0.0054	
170890	U.S.P. XVII ⁴	4.0%	6.109	3.542	4.479	2.192	3.381	0.771	0.463	0.0242	0.217	0.0049	0.0521	0.005	
170900	Wesson's Modified Osborne-Mendel ³	3.5%	4.799	3.470	5.321	1.549	4.227	0.843	0.636	0.0013	0.0566	0.0035	0.0025		0.009
170911	Williams-Briggs Modified	3.5%	6.232	3.993	3.829	2.109	3.472	0.644	0.465	0.0006	0.0252	0.0052	0.0501	0.0118	
170915	AIN-76 ^{5,6}	3.5%	5.155	3.984	3.602	1.019	1.571	0.337	0.507	0.0002	0.0351	0.0056	0.0585	0.0314	
TD94046	AIN-93G-MX ⁷	3.5%	5.0	1.561	3.60	1.019	1.571	0.301	0.502	0.0002	0.036	0.0058	0.0105	0.032	0.001
TD94049	AIN-93M-MX ⁷	3.5%	5.0	1.992	3.60	1.019	1.571	0.301	0.502	0.0002	0.036	0.0058	0.0105	0.032	0.001

¹Also contributes (g/Kg) 0.0001 selenium, 0.00042 chromium (revised No. 4164).

²Also contributes (g/Kg) 0.00068 molybdenum, 0.00034 selenium.

³And trace of Al.

⁴And trace of Co.

⁵Also contributes (g/Kg) 0.0001 selenium, 0.002 chromium, 4.13105 sucrose.

⁶A modification (TD 79055) is prepared without calcium and phosphorus.

⁷Also contributes (mg/Kg diet) 0.15 Mo, 0.15 Se, 5.0 Si, 1.0 Cr, 0.5 Ni, 0.5 B, 0.1 Li, 0.1 V, and (g/Kg diet) sucrose 7.73 (TD 94046) & 7.33 (TD 94049).

Mineral Mix, AIN-76

170915		<i>g/Kg</i>
Calcium Phosphate, dibasic	CaHPO ₄	500.0
Sodium Chloride	NaCl	74.0
Potassium Citrate, monohydrate		220.0
Potassium Sulfate	K ₂ SO ₄	52.0
Magnesium Oxide	MgO	24.0
Manganous Carbonate		3.5
Ferric Citrate		6.0
Zinc Carbonate		1.6
Cupric Carbonate		0.3
Potassium Iodate	KIO ₃	0.01
Sodium Selenite	Na ₂ SeO ₃ -5H ₂ O	0.01
Chromium Potassium Sulfate	Crk(SO ₄) ₂ -12H ₂ O	0.55
Sucrose, finely powdered		118.03

Designed for use at 3.5% (35 g/Kg of diet).

Reference: Report of the American Institute of Nutrition Ad Hoc Committee on Standards for Nutritional Studies (1977) J. Nutrition 107, 1340-1348.

Mineral Mix, AIN-93G-MX

TD 94046		<i>g/Kg</i>
Calcium Carbonate		357.0
Potassium Phosphate, monobasic	KH ₂ PO ₄	196.0
Potassium Citrate, monohydrate		70.78
Sodium Chloride	NaCl	74.0
Potassium Sulfate	K ₂ SO ₄	46.6
Magnesium Oxide	MgO	24.3
Ferric Citrate		6.06
Zinc Carbonate		1.65
Manganous Carbonate		0.63
Cupric Carbonate		0.31
Potassium Iodate	KIO ₃	0.01
Sodium Selenate	Na ₂ SeO ₄	0.01025
Ammonium Paramolybdate	(NH ₄) ₆ Mo ₇ O ₂₄ ·4H ₂ O	0.00795
Sodium Meta-silicate	Na ₂ SiO ₃ ·9H ₂ O	1.45
Chromium Potassium Sulfate	Crk(SO ₄) ₂ ·12H ₂ O	0.275
Lithium Chloride	LiCl	0.0174
Boric Acid	H ₃ BO ₃	0.0815
Sodium Fluoride	NaF	0.0635
Nickel Carbonate, hydroxide, tetrahydrate		0.0318
Ammonium Vanadate	NH ₄ VO ₃	0.0066
Sucrose, finely ground		220.716

Reference: J. Nutrition 123:1939-1951, 1993. Supplies the recommended concentrations of mineral elements for AIN-93G diet, when mineral mix is used at 35 g/Kg of diet.

Mineral Mix, AIN-93M-MX

TD 94049		<i>g/Kg</i>
Calcium Carbonate		357.0
Potassium Phosphate, monobasic	KH ₂ PO ₄	250.0
Potassium Citrate, monohydrate		28.0
Sodium Chloride	NaCl	74.0
Potassium Sulfate	K ₂ SO ₄	46.6
Magnesium Oxide	MgO	24.3
Ferric Citrate		6.06
Zinc Carbonate		1.65
Manganous Carbonate		0.63
Cupric Carbonate		0.31
Potassium Iodate	KIO ₃	0.01
Sodium Selenate	Na ₂ SeO ₄	0.01025
Ammonium Paramolybdate	(NH ₄) ₆ Mo ₇ O ₂₄ ·4H ₂ O	0.00795
Sodium Meta-silicate	Na ₂ SiO ₃ ·9H ₂ O	1.45
Chromium Potassium Sulfate	Crk(SO ₄) ₂ ·12H ₂ O	0.275
Lithium Chloride	LiCl	0.0174
Boric Acid	H ₃ BO ₃	0.0815
Sodium Fluoride	NaF	0.0635
Nickel Carbonate, hydroxide, tetrahydrate		0.0318
Ammonium Vanadate	NH ₄ VO ₃	0.0066
Sucrose, finely ground		209.496

Reference: J. Nutrition 123:1939-1951, 1993. Supplies the recommended concentrations of mineral elements for AIN-93M diet, when mineral mix is used at 35 g/Kg of diet.

Vitamin Mixtures

Harlan Teklad offers several frequently prepared vitamin mixes (see examples), and can design modifications/custom mixes to your specifications.

Vitamin Mix	
40060	g/Kg
p-Aminobenzoic Acid	11.0132
Ascorbic Acid, coated (97.5%)	101.6604
Biotin	0.0441
Vitamin B ₁₂ (0.1% trituration in mannitol)	2.9736
Calcium Pantothenate	6.6079
Choline Dihydrogen Citrate	349.6916
Folic Acid	0.1982
Inositol	11.0132
Menadione	4.9559
Niacin	9.9119
Pyridoxine HCl	2.2026
Riboflavin	2.2026
Thiamin HCl	2.2026
Dry Vitamin A Palmitate (500,000 U/g)	3.9648
Dry Vitamin D ₃ (500,000 U/g)	0.4405
Dry Vitamin E Acetate (500 U/g)	24.2291
Corn Starch	466.6878

Designed for use at 1% (10 g/Kg of diet).

This general-purpose vitamin mix has been used by researchers for many years and provides a margin of safety for many of the vitamins.

Vitamin Mix, A.O.A.C.	
40055	g/Kg
Vitamin A and D Powder	4.0
(Vitamin A Acetate: 500,000 U/g; Vitamin D ₃ : 50,000 U/g)	
Dry Vitamin E Acetate (500 U/g)	20.0
Menadione (Vitamin K ₃)	0.5
Choline Dihydrogen Citrate	487.805
p-Aminobenzoic Acid	10.0
Inositol	10.0
Niacin	4.0
Calcium Pantothenate	4.0
Riboflavin	0.8
Thiamin HCl	0.5
Pyridoxine HCl	0.5
Folic Acid	0.2
Biotin	0.04
Vitamin B ₁₂ (0.1% trituration in mannitol)	3.0
Dextrose, anhydrous	454.655

Designed for use at 1% (10 g/Kg of diet).

Reference: Association of Official Agricultural Chemists, Washington, D.C., 1960. Official Methods of Analysis of the Association of Official Agricultural Chemists, Ninth Edition, page 680, paragraph 39.133.

Vitamin Mix, AIN-76A	
40077	g/Kg
Thiamin HCl	0.6
Riboflavin	0.6
Pyridoxine HCl	0.7
Niacin	3.0
Calcium Pantothenate	1.6
Folic Acid	0.2
Biotin	0.02
Vitamin B ₁₂ (0.1% trituration in mannitol)	1.0
Dry Vitamin A Palmitate (500,000 U/g)	0.8
Dry Vitamin E Acetate (500 U/g)	10.0
Vitamin D ₃ Trituration (400,000 U/g)	0.25
Menadione Sodium Bisulfite Complex	0.15
Sucrose, fine powder	981.08

Designed for use at 1% (10 g/Kg of diet).

References: Second report of the Ad Hoc Committee on Standards for Nutritional Studies (1980) J. Nutrition 110, 1726.

Report of the American Institute of Nutritional Ad Hoc Committee on Standards for Nutritional Studies (1977) J. Nutrition 107, 1340-1348.

This vitamin mix was designed without a choline source. Choline bitartrate was listed as a separate item in the formula of the AIN-76A Purified Diet.

Vitamin Mix, AIN-93-VX	
TD 94047	g/Kg
Nicotinic Acid	3.0
Calcium Pantothenate	1.6
Pyridoxine HCl	0.7
Thiamin HCl	0.6
Riboflavin	0.6
Folic Acid	0.2
D-Biotin	0.02
Vitamin B ₁₂ (0.1% in mannitol)	2.5
DL-Alpha Tocopheryl Acetate (500 IU/g)	15.0
Dry Vitamin A Palmitate (500,000 IU/g)	0.8
Vitamin D ₃ (cholecalciferol, 500,000 IU/g)	0.2
Vitamin K (phyloquinone)	0.075
Sucrose, finely ground	974.705

Reference: J. Nutrition 123:1939-1951, 1993. Supplies the recommended concentrations of vitamins for AIN-93G and AIN-93M diets, when vitamin mix is used at 10 g/Kg of diet (the choline source is listed as a separate item in those diets).

Raw Materials

The same high-quality ingredients used in making diets at Harlan Teklad are supplied to those who choose to prepare their own diets.

The more common items are listed. Please ask our order department about additional items. We will be happy to quote price and availability.

Protein Sources	Product Number
Casein, high protein	160030
Casein, "Vitamin-Free" test	160040
Casein, soluble sodium caseinate	160100
Casein Hydrolysate (acid), low-salt, powder	160060
Casein Hydrolysate (enzymatic), powder, extra soluble	160090
Egg White Solids, spray-dried	160230
Gelatin	160280
Gluten Wheat, vital	160290
Lactalbumin (small particle size)	160315
Lactalbumin, ring-dried	160310
Milk Powder, skim	160370
Soy Assay Protein	160480

Carbohydrate Sources	Product Number
Dextrose, monohydrate	160190
Dextrose, anhydrous	160195
Corn Starch	160170
Maltodextrin	160175
Sucrose, granular	160482
Dextrin, white, technical	50740
D-Fructose	50250
D-Galactose	50300
α -Lactose, monohydrate, USP	50640

What is "Vitamin-Free" Test Casein?

"Vitamin-Free" Test Casein is an alcohol-extracted casein prepared from regular casein, and typically has 90-91% protein (%N x 6.38), 0.1% fat, and 4-6% moisture. The alcohol extraction reduces fat, fat soluble vitamins, and some of the B vitamins.

This protein source is used mostly in vitamin deficient diets, and when researchers want to minimize "background fat" in a diet.

We have prepared this specialty ingredient for many years, and continue to supply it to many labs. We will develop special pricing on request for large quantities. Advance notice is recommended for orders of 1,000 Kg or more. If you need this ingredient, consider Harlan Teklad as your preferred source.

Fat Sources	Product Number
Beef Tallow	160115
Coconut Oil	160120
Coconut Oil, hydrogenated	160130
Corn Oil	160150
Corn Oil, tocopherol-stripped	160160
Cottonseed Oil	160180
Lard	160340
Lard, tocopherol-stripped	160350
Olive Oil	160400
Peanut Oil	160430
Safflower Oil	160470
Vegetable Oil, hydrogenated	160485
Soybean Oil	160475

Vitamins	Product Number
Vitamin A Palmitate (500,000 U/g), gelatin-coated	30030
Vitamin A Palmitate (1,000,000 U/g), in oil	30040
Vitamin A Acetate and Vitamin D ₃ (Vitamin A: 500,000 U/g; Vitamin D ₃ : 50,000 U/g)	30050
p-Aminobenzoic Acid (PABA)	30070
L-Ascorbic Acid (Vitamin C)	30080
Vitamin B ₁₂ (0.1% trituration with mannitol)	30120
Vitamin B ₁₂ , crystalline (Cyanocobalamin)	30100
Biotin, crystalline	30140
Choline Bitartrate	30190
Choline Chloride	30200
Choline Dihydrogen Citrate	30220
Vitamin D ₃ , water dispersible powder (500,000 U/g)	30340
Vitamin D ₃ Activated Dehydrocholesterol (40,000,000 U/g)	30350
Folic Acid	30370
I-Inositol (meso-Inositol)	30390
Menadione, 2-methyl-1, 4-naphthoquinone	30400
Menadione Sodium Bisulfite	30430
Nicotinic Acid (Niacin)	30440
Nicotinic Acid Amide (Niacinamide)	30450
D-Pantothenic Acid, Calcium salt	30460
Pyridoxine HCl (Vitamin B ₆ HCl)	30510
Riboflavin (Vitamin B ₂)	30520
Thiamin HCl (Vitamin B ₁ HCl)	30540
DL-a-Tocopherol (1,100 U/g)	30580
DL-a-Tocopheryl Acetate (1,000 U/g)	30590
DL-a-Tocopheryl Acetate, powder (500 U/g)	30600

Crude Vitamin Sources	Product Number
Cod Liver Oil (Vitamin A: 850 U/g; Vitamin D ₃ : 85 U/g)	40010
Liver, desiccated, N.F. whole liver (whole liver substance)	40030
Yeast, Torula	40115
Yeast, Brewer's type	40090

Amino Acids	Product Number
L-Alanine	10020
L-Arginine	10090
L-Aspartic Acid	10160
L-Cystine	10360
L-Glutamic Acid	10480
Glycine	10060
L-Histidine HCl.H ₂ O	10620
L-Isoleucine	10720
L-Leucine	10770
L-Lysine HCl	10830
DL-Methionine	10850
L-Methionine	10860
L-Phenylalanine	10950
L-Proline	10960
L-Serine	11010
L-Threonine	11040
L-Tryptophan	11100
L-Tyrosine	11130
L-Valine	11160

Miscellaneous	Product Number
Cholesterol	80050
Cellulose (fiber, non-nutritive)	160390
Rice	160450
Agar	160010
Cholic Acid	90090
Sodium Chololate	90340
Corn, yellow, ground	160140
Egg Powder, whole	160200
Egg Yolk Powder	160240
Milk Powder, whole	160380

Service and Ordering Information

For information, or to place an order, contact:

Harlan Teklad

P.O. Box 44220

Madison, Wisconsin 53744-4220

Phone: (608) 277-2074

Fax: (608) 277-2066

Shipping

We will suggest an appropriate delivery method for the circumstances, unless a particular method is specified. These costs typically are prepaid and added to the invoice (FOB Madison, Wisconsin). Weight and delivery method affect shipping costs.

Storage

Research diets are perishable and should be refrigerated (4°C or less). As a general guideline, diets can be stored this way for up to six months. Some unique diets should be used sooner.



Harlan Teklad has many options available for packaging and shipping of your research diet. The fiber drums (25 and 50 kg) and two smaller size cartons withstand a wide variety of shipping conditions. Every container also includes a 3-mil poly liner to keep your research diet as fresh as possible. We also can discuss options such as vacuum packing, heat-sealed and specific quantity packaging.

Experience Counts

The Harlan Teklad employees in this picture represent over 60 years of experience in customer service, nutrition, production, quality assurance, and general management of diet manufacturing. Trust the experience of Harlan Teklad for all your research diet needs.