Successful Swimming Pool Maintenance has been read by thousands of pool owners and continuously recommended by pool supply dealers as an invaluable guide to proper pool care.

All recommendations are based on data obtained from laboratory tests, field tests and other studies conducted by the Purex Pool Products Division.

This newly-revised edition of Successful Swimming Pool Maintenance gives you latest, up-to-date information on pool care methods, many of which have resulted from new product advances.

Purex, a pioneering name in pool chemicals, is proud to have contributed to these advances by development of Guardex products which make it easier than ever for you to ensure successful swimming pool maintenance.

[illegible] about pool care

A pool is probably one of the most important investments of your lifetime. It should be a pleasure --never a problem. Yet, serious problems and needless expense **can** result from neglect or improper treatment of pool water.

How you maintain pool water governs its cleanliness, clarity and color. Correct care is also vital to the health protection of your family and swimming guests. It helps prevent troublesome problems and rewards you with a beautiful, sparkling clear pool.

The more you know about pool care, the more you will get from your pool—in attractive appearance, in swimming enjoyment and in investment value.

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Two pool guests you do not want are algae and bacteria. To get rid of them and make pool water sanitary for swimming—as well as to improve the water's taste, odor and clarity—some sort of disinfectant must be used.

Chlorine, universally approved by health authorities, is the accepted disinfecting agent for bacteria. And, by maintaining a free chlorine residual of no less than 1.0 ppm (parts-per-million), algae also can be prevented.

[illegible]

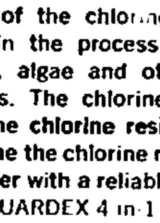
When you add chlorine to pool water, a portion of the chlorine will be consumed in the process of destroying bacteria, algae and other oxidizable materials. The chlorine remaining is called the chlorine residual. You can determine the chlorine residual of your pool water with a reliable test kit, such as the GUARDEX 4-in-1 Test Kit, available from your Guardex dealer.

You must maintain a free chlorine residual level adequate enough to assure a continuous kill of bacteria or virus introduced into pool water by swimmers, through the air, from dust, rain or other sources.

Since chlorine residual is lowered by sunlight (its ultra-violet rays decompose chlorine) it is impossible to maintain a constant residual level with most forms of chlorine unless a mechanical device—a Hypochlorinator—is used to feed the chlorine compound continuously.

Whether or not you have such a device, it is wise to test pool water regularly, never allowing chlorine residual to drop below 1.0 ppm (parts-per-million), the minimum level for effective chlorination.

Rule: Maintain a chlorine residual no lower than 1.0 ppm.



guardex pool chlorine concentrate

Guardex is a dry granular chlorine developed to give poolowners several improvements in chemical effectiveness as well as convenience.

After reading the previous section discussing chlorine residual, you can appreciate the value of a chlorine which helps you maintain a more stable chlorine residual. Guardex does.

Because it has a built-in stabilizing ingredient (trihydroxy triazine) Guardex drastically reduces wasteful chlorine loss caused by sunlight. After a sufficient amount of stabilizer has been added to pool water—a single addition of Guardex Conditioner is the easiest way—a few ounces of Guardex Pool Chlorine Concentrate added every other day can maintain a continuous chlorine residual.

Guardex has other advantages. It cuts acid costs up to 50% or more and does not contain calcium or other scale-forming salts. It dissolves rapidly and completely, leaving no residue.

Guardex is not merely a dry equivalent of liquid chlorine but, for purposes of comparison, roughly four ounces of GUARDEX is used to replace one gallon of 14% liquid pool chlorine or 16 - 24 ounces of calcium hypochlorite. Guardex naturally eliminates the nuisance of bottle carrying, constant deposit-return trips and storage problems. While liquid chlorines tend to deteriorate more rapidly, Guardex has excellent storage stability.

Your local Guardex dealer has Guardex Pool Chlorine Concentrate in handy two-ounce foil packets by the carton, or in larger bulk containers.

ADVANTAGES OF GUARDEX OVER CALCIUM HYPOCHLORITE

1. Rapid and complete solubility of the GUARDEX; leaving no residue. Thus the chlorine level is rapidly built up in the pool. This can be demonstrated readily in a pool or even in a store using a small volume of water.
2. Maintains a much more stable chlorine residual. Under use conditions it has been shown that the photo-chemical decomposition of sodium or calcium hypochlorite at pool concentrations and 7.2 - 7.3 pH is as much as 10 times as fast as when the same total active chlorine is supplied from Guardex Dry Chlorine Concentrate. A pool owner can be assured of chlorine protection while he swims, without having to overdose in a futile effort to allow for sunlight loss.
3. Requires considerably less product to properly chlorinate the pool water — this means less chemicals to handle and to store for the pool owner as well as the dealer and distributor.
4. More stable on storage — the available chlorine loss during storage is extremely low even after more than a years storage at temperatures as high as 140°F.
5. Does not add any calcium (scale forming) ions to the pool water.
6. There is a much slower build up of chemicals (salts) in the pool water.
7. Does not increase the pH of the pool water so that in areas of high alkalinity water, less acid is needed to keep the pH in the desired range. In areas of low pH, low total alkalinity water, an initial adjustment of the alkalinity with Guardex pH Stabilizer will result in little or no need for pH adjustment during the swimming season if GUARDEX is used.

ADVANTAGES OF GUARDEX POOL CHLORINE CONCENTRATE OVER:

Sodium Hypochlorite

1. GUARDEX provides a stable protective chlorine residual in the pool with only every other day doses depending on the bathing load and other pool conditions. The chlorine residual from sodium hypochlorite will "burn out" after only a few hours of sunlight.
2. GUARDEX reduces the amount of acid required to keep the pH in balance.
3. The use of GUARDEX rather than sodium hypochlorite reduces considerably the salt build up in pool water.
4. GUARDEX has excellent storage stability.
5. GUARDEX is much easier to handle and store and far more convenient to use; i.e., requires less material to treat the pool, no bottle deposits or returns, no corrosive liquid to splash on your clothes.

GUARDEX POOL CARE GUIDE

Pool Capacity Gallons	Guardex Conditioner Just Once...	Guardex Chlorine Concentrate Average Every Other Day Dosage*
5,000	1 Bag	1-1½ ounces
10,000	2 Bags	2-3 ounces
15,000	1 Carton	3-4½ ounces
20,000	1 Carton	4-6 ounces
25,000	1 Carton	5-7½ ounces
30,000	2 Cartons	6-9 ounces
35,000	2 Cartons	7-10½ ounces
40,000	2 Cartons	8-12 ounces

Consult Guardex packages for complete directions.

These are average dosages only, with variations in water temperature and swimming load the amount of GUARDEX required will vary. Use a reliable test kit and adjust dosage so that an 1.0 ppm residual remains 48 hours later. When the chlorine residual drops to 1.0 ppm it is time to add more GUARDEX.

ESTIMATING POOL GALLONAGE

Surface Area Method: SURFACE AREA x AVERAGE DEPTH (in feet) x 7.5 = Total Gallons.

Shape Method:*

Rectangular	AVERAGE LENGTH x AVERAGE WIDTH x AVERAGE DEPTH (in feet) x 7.5 = Total Gallons.
Circular	DIAMETER x DIAMETER x AVERAGE DEPTH (in feet) x 5.9 = Total Gallons.
Oval	LONG DIAMETER x SHORT DIAMETER x AVERAGE DEPTH (in feet) x 5.9 = Total Gallons.

*If pool has sloping sides multiply Total Gallons by 0.85.

GUARDEX CONDITIONING AND SWIMMING POOL PROGRAM

1. Clean or backwash filter and set for at least 8 hours continuous filtration.
2. If pool water is less than 7.4; adjust to 7.4-7.6 with GUARDEX pH Stabilizer.
3. Add GUARDEX Conditioner through the surface skimmer in the amounts shown below:

Size of Pool	Amount of Conditioner
10,000 gals.	2 bags
20,000 gals	1 carton
30,000 gals	2 cartons
40,000 gals	2 cartons

4. Wait 1-2 hours for Conditioner to disperse; then adjust pool water pH to 7.4-7.6.
5. Superchlorinate with GUARDEX Super Chlorinator or 1 gallon liquid pool chlorine per 20,000 gallons of water. (Wait for chlorine level to drop to approximately 2.0 ppm or below before swimming.)
6. Check chlorine res.. the next day and if it is not at least 1.0 ppm, repeat step 5.

After Conditioning

Add GUARDEX every other day to maintain at least an 1.0 ppm chlorine desidual for 48 hours. Generally this will require 2 - 3 oz. of GUARDEX per 10,000 gallons every other day. However, since differences in water temperature and swimming load affect chlorine consumption, you should use a reliable test kit to determine the actual amount of GUARDEX required for your pool.

If you should miss adding GUARDEX on your regular schedule and/or the chlorine residual drops to nil or zero, three times the every other day dosage should be added (daily if necessary) until the desired chlorine residual (1.0 ppm) is being maintained for 48 hours.

During the late fall and winter months when water temperatures are lower and swimming loads are lighter, the normal every other day dosage will be needed only once or twice a week.

superchlorination

Du :g the swimming season, superchlorination is recommended about once every other week, treating the pool water with GUARDEX Super Chlorinator or 1 gallon of "Purex Pool Chlorine 14" per each 20,000 gallons.

If water temperatures reach 85° F. or higher, or if you have a large number of daily swimmers, once-a-week superchlorination is desirable. Superchlorination is not required normally when pool water temperature is below 75°F., provided a constant chlorine residual of at least 1.0 ppm is maintained.

Superchlorination is needed to destroy ammonia that may be added to the water by small children who are not "pool trained" and from lawn and garden fertilizers that find their way into the pool. Ammonia ties up chlorine so it is not nearly as effective an algaecide or bactericide. It also may cause severe eye irritation.

In addition, superchlorination is needed for algae control when continuous chlorine residuals are not being maintained or where filtration and pool water circulation are not ideal.

control of pH

The term pH refers to the acid-alkaline balance of water expressed on a numerical scale from 0 to 14. A test kit for measuring pH balance of your pool water is available from your Guardex dealer.

Strongly Acid					Neutral							Strongly Alkaline		
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Muriatic Acid has a pH of about 0. Pure water is 7 (neutral). Weak Lye solutions have a pH of 13-14.

Rule: 7.4 to 7.6 is a desirable pH range.

It is essential to maintain correct pH. If pH becomes too high (over alkaline) it has these effects:

1. Greatly lowers the ability of chlorine to destroy bacteria and algae.
2. Water becomes cloudy.
3. There is more danger of scale formation on the plaster or in the coils of the heater.
4. Filter may become blocked.

If pH is too low (over acid) there may be:

1. Excessive eye burn or skin irritation.
2. Etching of the plaster.
3. Corrosion of metal fixtures in the filtration and recirculation system, which may create brown, blue, green or sometimes almost black stains on the plaster.
4. If you have a sand and gravel filter, the alum used as a filter aid may dissolve and pass through the filter.

Caution: Do not test for pH when the chlorine residual is 0.8 or higher, to avoid a false reading. Some test kits, such as the Guardex 4-in-1 Test Kit contain a de-chlorinator to enable you to check pH in the presence of higher chlorine residuals.

Rule: Chemicals that are acid lower pH. Chemicals that are alkaline raise pH.

6.8	7.0		7.2		7.4	7.6	7.8		8.0	8.2	8.4
...Add Guardex pH Stabilizer		.....	Marginal	.....	Ideal	.....	Marginal	.....	Add Acid	.....	

acid demand

When your pool is over-alkaline it "demands" acid. How much acid you should add can be determined with a Guardex 4-in-1 Test Kit.

If you do not have a test kit that performs Acid Demand Tests, you generally should add no more than one pint of Muriatic Acid per 20,000 gallons at a time, checking the pH again after about an hour to see if more is needed.

In some areas with low total alkalinity one quart of acid may be too much to add at one time. And, in areas with high total alkalinity as much as a half-gallon or more of acid may be needed at one time to adjust the pH. We will discuss this further in the next section on Alkalinity.

Acid of any type should always be added into the stream of water returning from the filter. Avoid the vicinity of the surface skimmer or any metal fixtures in the pool. Be especially careful to add liquid acid slowly, about 18 inches away from the sides of your pool, the Pump should be running so that the pool water is circulating.

Guardex Dry Pool Acid is preferred by many poolowners since it is easier to use and avoids possible damage to pool or clothing from "backsplash." Broadcast approximately 8 ounces at a time per 20,000 gallons around the deep end of your pool. (CAUTION: The concentrated dry acid is a poison, is harmful if swallowed and can cause burns on skin and eyes. Read the cautions on the label before using.)

You will find it is much simpler to adjust pH, once the total alkalinity has been adjusted.

HIGH

Total alkalinity is a measurement of the total amount of alkaline chemicals in the water and controls pH to a great degree. (It is not the same as pH which refers merely to the relative alkalinity-acidity balance). Your pool water's total alkalinity should be adjusted to 80-120 ppm to permit easier pH control. See sections on high and low total alkalinity.

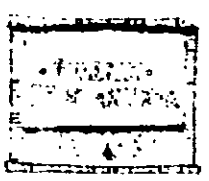
A total alkalinity test is simple to perform, using the Guardex 4-in-1 Test Kit. You will need to test about once a week until alkalinity is in the proper range. Then, only once every month or so to be sure it is being maintained.

Rule: Maintain total alkalinity in the 80-120 ppm range.

In many parts of the United States the alkalinity of the water is high (in some cases, as much as 300-400 ppm) and as a result, the pH of the water tends to remain high (8.2-8.4).

Acid should be added to lower the pH to the desired 7.4-7.6 range, and the acid will destroy a small amount of the alkalinity. However, within the next 2 to 4 hours, the pH generally bounces back to above 8.0 because of the high total alkalinity reserve still remaining in the water.

Only by frequent adjustments of pH with acid will alkalinity eventually be lowered to the proper level to control pH. At this point, pH will be more or less "stabilized" and will tend to rise at a slower rate. Then, acid will be needed less frequently and in smaller amounts.



If you live in an area where the alkalinity of the water is abnormally low, the water tends to be corrosive to the plaster finish. And, pH often is too easily lowered to the acid side of neutral (below 7.0) which results in severe eye irritation and corrosion of the metal fixtures.

In some areas, pool water has a high pH even though total alkalinity is low. Under these conditions, you should adjust alkalinity first and then adjust the pH. Otherwise, it is difficult to get pH in the proper range without going over-acid.

You can increase alkalinity to the desired 80-120 ppm range with the use of GUARDEX pH Stabilizer. For every 1½ pounds of GUARDEX pH Stabilizer added to 10,000 gallons of water, alkalinity is raised 10 ppm.

To figure how many pounds will be needed, use this formula:

1½ x A x B = Pounds GUARDEX pH Stabilizer needed.

A is the difference between desired alkalinity and current alkalinity, divided by 10. B is the number of gallons in your pool divided by 10,000.

Example:

A — 80 ppm desired alkalinity − 40 ppm current alkalinity = 40 ppm needed alkalinity; 40 ppm ÷ 10 = 4

B — 20,000 pool gallons ÷ 10,000 = 2

1½ x 4 x 2 = 12 pounds pH Stabilizer needed

Water hardness is a measurement of the amount of calcium and magnesium in your pool. Generally about 70-75% of the total hardness of your pool is calcium. Too much calcium in your pool is undesirable because it can cause the formation of calcium scale on the plaster finish or in the coils of a heater and can block the filter.

The amount of water hardness tends to increase in a pool due to evaporation and addition of refill water. The use of calcium hypochlorite also increases the water hardness. Generally when the water hardness reaches a level of 500-600 ppm the pool should be drained and refilled with fresh water.

Completely soft water with no hardness is undesirable in a pool because the water tends to be corrosive. A minimum value of about 80 ppm is recommended. If the water hardness level in a pool is too low, you can increase it by the addition of calcium chloride dihydrate. Every 1¼ lb. of this material added to 10,000 gallons of water will increase the hardness 10 ppm. This material is weakly acidic, so you should predissolve it in water before adding to the pool and check pool pH after addition.

If the water used to fill a pool has an excessive hardness value it may be desirable to pass 70-80% of the water through a softener before adding it to the pool.

The GUARDEX 4-in-1 Test Kit water hardness supplement will enable you to determine the amount of hardness in your pool water and your tap water in just a few minutes. The water hardness test should be performed about every six months.

the new pool

To protect a newly plastered pool, it is important to fill it with water immediately on completion. This is the ideal time to begin the Guardex pool care program. Use Guardex Conditioner just once, as directed, then proceed with regular Guardex chlorination. Warning: Chlorination while the pool is filling may cause stains on the walls. Begin as soon as the water has reached the tile line.

In areas where the total alkalinity is below 80 ppm pool acid is not added for about the first two weeks the new pool is in use. This allows the fresh plaster time to harden properly and become balanced with the pool water. If the water's total alkalinity is very low, it should be adjusted before the first addition of acid.

However, in some areas where the total alkalinity is greater than 80 ppm, the pH should be adjusted by carefully adding small amounts of acid to adjust the pH to no lower than 7.6.

During this first two-week period, a regular chlorination schedule should be established. Daily brushing with a wall brush will remove the fine, cloudy sediment that accumulates on the wall and floor surfaces of a new pool. This condition will disappear in a few weeks.

Your filter should be in operation during and after the wall brushing to take the loosened sediment out of the water. Warning: Do not use a vacuum at this time, since the wheels may compress surface sediment into the wall pores and tend to form stain areas.

After this approximate two week period, you should adjust the pH to within the 7.4 to 7.6 range. Do not go below 7.2, as damage may result.

a word about filtration

Adequate filtration is very important to proper maintenance. With water temperatures above 75°F., filter **at least** 12 hours a day, (preferably 18-24 hours a day); with lower temperatures 6 to 8 hours a day is usually sufficient. For sand and gravel filters, a finer filtration is usually provided by use of Potassium Alum as a filter aid.

When adding chemicals to your pool, the filter always should be turned on and should remain in operation at least one hour to insure proper circulation and mixing.

pool water tests

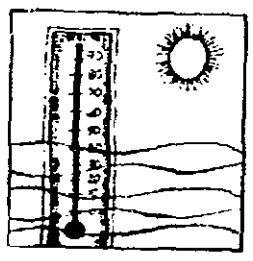
Get into the habit of testing your pool water regularly. It is the best insurance against trouble-causing problems.

For a new pool, you should make chlorine tests daily for about the first month or so. The pH test should be run daily if the total alkalinity is high and about twice a week when the alkalinity is in the proper range. It is also a good idea to keep a written record of treatment so you can see results and arrive at the best treatment for your pool.

During the swimming season, at least twice-a-week tests are usual and when your pool is not in use, continue with tests about once a week.

The Guardex 4-in-1 Test Kit gives a way to determine the four most important variables in pool water chemistry: Chlorine Residual, pH, Acid Demand and Total Alkalinity. Designed in one compact unit, the Guardex 4-in-1 Test Kit affords an easy, complete and highly reliable guide to proper pool treatment.

solving common pool care problems



algae

Guardex Algae Control Concentrate is used as a supplement to regular chlorination for algae prevention. If algae has started to develop already, particularly the dark green (black) algae, it should be destroyed as soon as possible since the longer it is allowed to exist, the more difficult it is to remove. You may use one of several methods:

1) Add 16 ounces of Guardex Algae Control to every 20,000 gallons of pool water. The algae spots on the plaster should be brushed thoroughly using a stainless steel brush if necessary. Adjust pH to the proper level, then add a triple dose of chlorine.

2) Adjust the pH to about 7.2. You may have to accomplish this in several steps, adding each dose of acid about one hour apart. During this time the spots should be brushed thoroughly using a stainless steel brush, if necessary, to remove most of the raised portion of the algae. About one-half hour to an hour after the last dose of acid is added, add 4 gallons of chlorine (10-14% Sodium Hypochlorite) per 10,000 gallons of water. Allow the filter to run continuously for about 24 hours. Brush all spots again the next day. Be sure to remove algae that forms as a mat around the light-rim or where the ladder attaches to the plaster. Examine any refill water pipes to be sure there is no algae present to re-infect the pool. Also, clean your brush with a strong bleach solution to kill algae cells clinging to the fibers. Do not resume swimming until the chlorine residual drops to 2.0 ppm or less.

red water

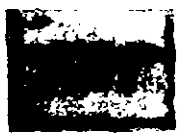
The presence of iron will be indicated if the water takes on a reddish-brown color after the addition of chlorine.

In areas where iron is present in the water, the following procedure is often followed—preferably immediately after the pool is filled and before any reddish color has been permitted to form—to prevent staining of the plaster.

Adjust pH to about 7.8. Floc with approximately 1 lb. Potassium Alum per 5,000 gallons pool water. Shut off the circulation system and add about 3 times the every-other-day dose of chlorine. Allow the iron to settle, using additional Alum if necessary, and vacuum to waste as quickly as possible to prevent staining the plaster. If you have a diatomaceous earth filter, Alum can block the filter so that very frequent changing of diatomaceous earth would be necessary. Preferably, vacuum directly to waste.

electrolysis

Electrolysis is the corrosion of metallic objects in your pool caused by an electron flow in the pool and surrounding area. It is usually indicated by black stains radiating out from metallic objects. Electrolysis may be partially prevented by proper pH control. The possibility of electrolysis is increased by a high mineral content, as in pool water several years old. Because the causes of electrolysis are so complex and varying, it is suggested that you ask the advice of your Guardex dealer if the problem should occur.



scale

In hard water areas, pool water has a high calcium content, so it is necessary to control the pH and the total alkalinity carefully to prevent scale from forming. Scale is caused by deposits of calcium salts (usually calcium carbonate) and appears on the surface of the plaster or in the coils of the heater. It is often gray or brownish in color due to entrapped dirt or iron present in the water.

After a period of several years the calcium content and total hardness content of the pool increases — due to repeated evaporation of the pool water and the addition of refill water — to the point where it may be advisable to drain the pool and refill it with fresh water. It is a good policy to check your pool water for total hardness about twice a year.

stains

Yellowish-brown or reddish-brown stains which appear on plaster can be due to iron present in the water. Brown stains can also result from an over-acid condition, or adding acid too close to the surface skimmer when pipes or other fixtures in the filtration and recirculation system are made of iron or galvanized material. It is also wise to discourage the use of hair pins by those who swim in your pool since these can cause rust stains.

Take care not to use steel wool around the pool area. This will certainly create rust stains.

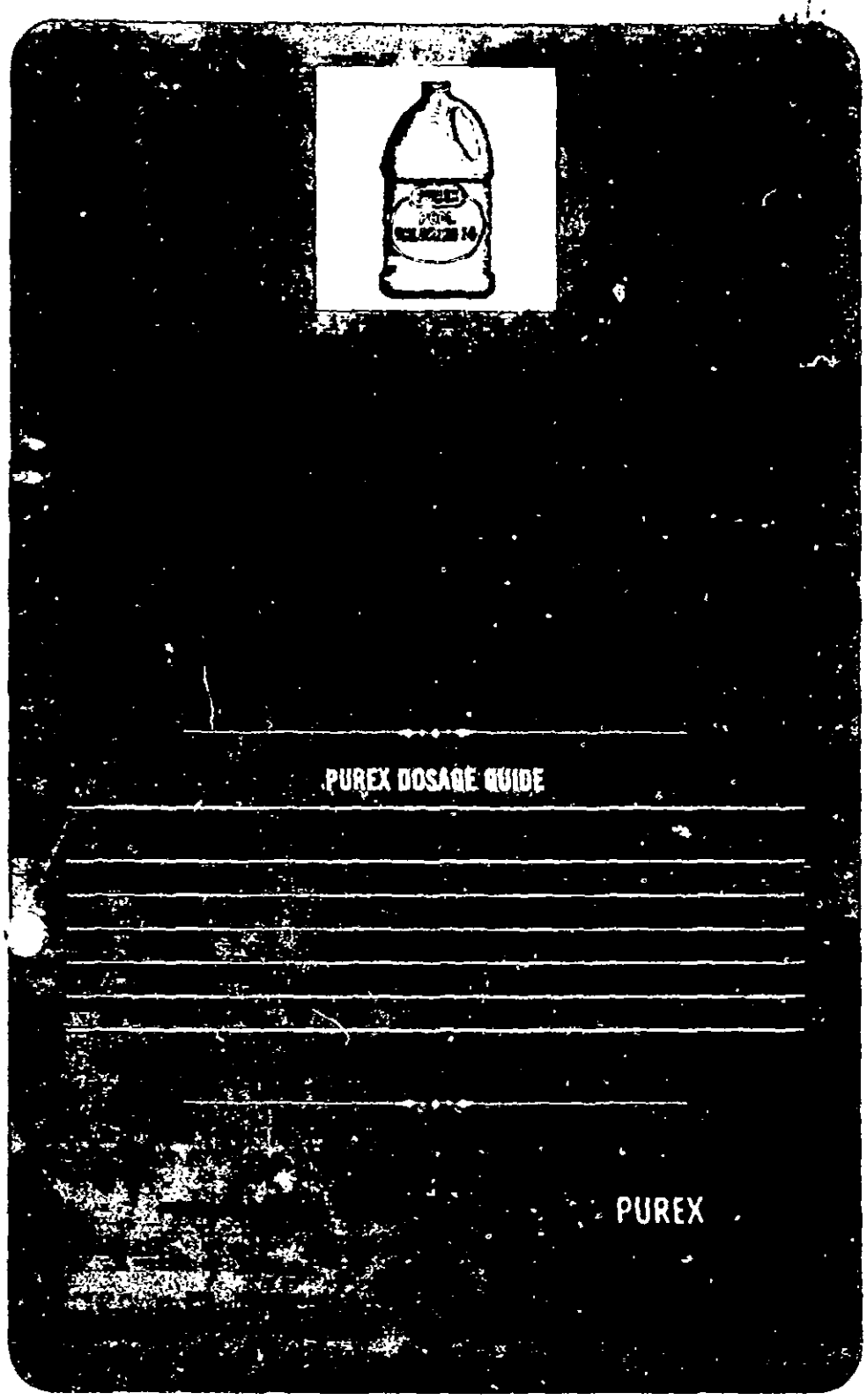
Blue, green or dark gray stains can form on plaster if too much acid is added to pool water at one time or, again, if it is added too near the automatic surface skimmer. These are copper stains and show that a small amount of copper has been dissolved from your pipes or filter tank by the low pH (over acid) pool water. Proper adjustment of pH and total alkalinity can prevent stains of this nature.

Scale or stains can be removed by draining and acid washing the pool. This should be done by trained personnel. Consult your Guardex dealer for his recommendation.

tile care

The tile strip above the water line will accumulate suntan oils, body oils and dirt. This scum line can be removed easily with Guardex Tile and Vinyl Cleaner Concentrate. Once-a-week maintenance is usual during the swimming season.

When lime scale is not readily removed from tile, a diluted solution of Muriatic Acid (1 part acid to 6 parts water) or Guardex Dry Acid (3 to 4 ounces to one pint water) can be used. Do not add enough acid to drop the pool water pH below 7.2.



Guardex Pool Diary

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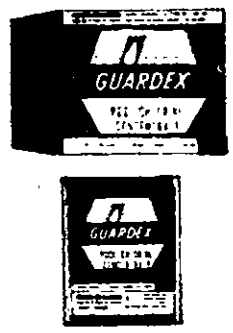
Pool Gallonage **Date Filled**

Date	Chlorine	pH	Total Alk.	Total Hardness	Additions	Date	Chlorine	pH	Total Alk.	Total Hardness	Additions

Guardex products are available in most areas. Ask your dealer.

GUARDEX Conditioner

Makes GUARDEX chlorination simpler, more effective. Should be used when you change from another method of chlorination to GUARDEX, and when the pool is freshly filled. 5 lb. carton.



GUARDEX Chlorine Concentrate

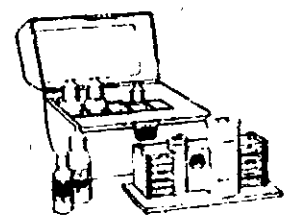
Instant-dissolving granules leave no residue, provide highly efficient chlorination. Has a built-in stabilizing ingredient (trihydroxy triazine) which reduces wasteful chlorine loss due to sunlight. Has no calcium or other scale-forming minerals. In handy 2-oz. foil packets or bulk.

GUARDEX Dry Acid

Easy to use granular acid for pH control. Unbreakable plastic container with convenient ounce-guide on side.

GUARDEX Tile Cleaner

A powder specially formulated for pool care. In white plastic container.



GUARDEX 4-in-1 Test Kit

Combines the four major pool water tests: Chlorine Residual, pH, Acid Demand and Total Alkalinity, in one compact plastic kit.

Algae Control Concentrate

Handy one quart size. Liquid formula to help prevent algae growth. In easy-to-pour plastic container.

WHY ARE GUARDEX PRODUCTS SOLD ONLY AT AUTHORIZED DEALERS?

From more than 25 years experience in pool chemicals, the Purex Corporation knows there is no substitute for personal, on-the-spot advice—just as there is no substitute for quality in pool products.

Guardex products give you quality you can depend on. Your Guardex dealer gives you advice you can depend on. He knows local water conditions. He is there to tell you if local weather conditions require treatment changes. Together, Guardex products and your Guardex dealer help make pool care easier for you. And more economical too. It always pays to give your pool the best care!